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Configuring Ethernet, FDDI, and Token Ring Services

NORTEL NETWORKS™

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Preface

This guide describes Ethernet, FDDI, and token ring services and what you do to start and customize these services on a Nortel Networks™ router.

You can use the Bay Command Console (BCC™) or Site Manager to configure Ethernet, FDDI, and token ring services on a router. In this guide, you will find instructions for using both the BCC and Site Manager.

Before You Begin

Before using this guide, you must complete the following procedures. For a new router:

- Install the router (see the installation guide that came with your router).
- Connect the router to the network and create a pilot configuration file (see *Quick-Starting Routers*, *Configuring BayStack Remote Access*, or *Connecting ASN Routers to a Network)*.

Make sure that you are running the latest version of Nortel Networks BayRS™ and Site Manager software. For information about upgrading BayRS and Site Manager, see the upgrading guide for your version of BayRS.

Text Conventions

This guide uses the following text conventions:

angle brackets (< >)	Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: If the command syntax is: **ping** <*ip_address*>, you enter: **ping 192.32.10.12**
bold text	Indicates command names and options and text that you need to enter. Example: Enter **show ip** {**alerts** | **routes**}. Example: Use the **dinfo** command.
italic text	Indicates file and directory names, new terms, book titles, and variables in command syntax descriptions. Where a variable is two or more words, the words are connected by an underscore. Example: If the command syntax is: **show at** <*valid_route*> *valid_route* is one variable and you substitute one value for it.
`screen text`	Indicates system output, for example, prompts and system messages. Example: `Set Trap Monitor Filters`

separator (>)	Shows menu paths. Example: Protocols > IP identifies the IP option on the Protocols menu.
vertical line (|)	Separates choices for command keywords and arguments. Enter only one of the choices. Do not type the vertical line when entering the command. Example: If the command syntax is: **show ip** {**alerts** | **routes**}, you enter either: **show ip alerts** or **show ip routes**, but not both.

Acronyms

This guide uses the following acronyms:

BofL	Breath of Life (message or packet)
CMT	connection management
CSMA/CD	carrier sense multiple access with collision detection
FDDI	Fiber Distributed Data Interface
IP	Internet Protocol
IPX	Internetwork Packet Exchange
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector (formerly CCITT)
LAN	local area network
LEM	link error monitoring
LER	link error rate
LLC	logical link control
MAC	media access control
MAU	media access unit or multistation access unit

MDI	media dependent interface
MIB	management information base
MIC	media interface connector
MII	media independent interface
NIF	neighbor information frame
NSA	network service address
OSI	Open Systems Interconnection
PC	physical connection
PDU	protocol data unit
PHY	physical layer
PMD	physical layer media dependent
PROM	programmable read-only memory
RMT	ring management
SMT	station management
SRF	status report frame
STP	shielded twisted pair
TCI	tag control information
TPE	twisted pair Ethernet
TPID	tag protocol identifier
TTP	Timed-Token Protocol
TTRT	token target rotation time
TVX	valid transmission timer
UTP	unshielded twisted pair
VLAN	virtual LAN
WAN	wide area network
XNS	Xerox Network System

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Chapter 1
Getting Started

Ethernet, FDDI, and token ring services comprise the physical and data link layer (*line*) services for configured LAN circuits on a Nortel Networks router. This chapter shows you how to access those services on a Nortel Networks router.

Note: In the OSI internetworking model, the *physical layer* manages the transmission of bits across the physical media (for example, cable or modem interface); the physical layer protocol defines the electrical and mechanical interface. The *data link layer* defines the procedures for transferring data accurately and reliably across the physical layer.

This guide assumes that the router's configuration file includes Ethernet, FDDI, or token ring network circuits. See *Configuring and Managing Routers with Site Manager* for information about adding circuits.

Accessing Line Services

When you add an Ethernet, FDDI, or token ring circuit, the router software automatically sets default values for line services.

Using the BCC

Using the **show config -all** command, you can view the current configuration of a Nortel Networks router, including the location of configured line services.

Note: This guide assumes that you are working with a router configuration file that already contains the appropriate WAN circuits for the hardware configuration. See *Configuring and Managing Routers with Site Manager* for information about adding circuits to a configuration file.

To locate configured line services, execute the **show config -all** command as follows:

box# **show config -all**

```
box type frecn
    board slot 13
      type qenf
  back
  console portnum 1
      prompt {"%slot%:"}
      auto-manager-script automgr.bat
      auto-user-script autouser.bat
  back
  ethernet slot 13 connector 1
      circuit-name E131
    auto-neg
    back
    ip address 192.168.133.114 mask 255.255.255.224
      arp
      back
      rip
      back
    back
  back
    fddi slot 11 connector 1
      circuit-name F111
    ip address 192.168.5.2 mask 255.255.255.0
      arp
      back
```

```
      back
    back
  tokenring slot 9 connector 1
        circuit-name O91
        speed 4Meg
      ip address 192.168.2.1 mask 255.255.255.0
        arp
        back
        rip
        back
      back
    back
```

To access line services, at the top-level box prompt use the output from the **show config -all** command and enter:

<interface_type> **slot** <*slot_number*> **connector** <*connector_number*>

interface_type	Name of a physical interface on the router
slot_number	Number of the slot on which the link module is located
connector_number	Number of a connector on the link module

For example, to access the Ethernet line services on slot 13, connector 1, navigate to the top-level box prompt and enter the following command:

```
box# ethernet slot 13 connector 1
```

To display the current values for the Ethernet line services, enter the following command:

```
ethernet/13/1# info
   on box
   state enabled
   circuit-name E131
   slot 13
   connector 1
   bofl enable
   bofl-timeout 5
   hardware-filter disable
   transmit-queue-length 0
   receive-queue-length 0
   bofl-retries 5
   bofl-tmo-divisor 1
   bofl-number 0
```

Using Site Manager

To view line services using Site Manager, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Circuits**.	
2. Choose **Edit Circuits**.	The Circuit List window opens, listing all available circuit types.
3. Choose the circuit for which you want to edit line service parameters, using these Site Manager abbreviations to guide you: E - Ethernet circuit type F - FDDI circuit type O - token ring circuit type	
4. Choose **Edit**.	The Circuit Definition window opens.
5. Choose **Lines**.	
6. Choose **Edit Lines**.	The Edit Lines window opens and lists the existing lines by slot number and connector name.
7. Choose the type of line that you want to edit.	
8. Choose **Edit**.	Depending on the type of circuit you selected in step 7, Site Manager displays the window showing the circuit's line details.

Note: For many circuit types, you can bypass steps 2 through 6 by clicking on the configured connector in the Configuration Manager window, and then clicking on Edit Line in the resulting window.

Customizing Line Services

When you add an Ethernet, FDDI, or token ring circuit, the line service parameters take default values that suit many networks. You can, however, modify those values to suit your network composition and requirements.

The *circuit type* determines how you customize line services. To learn how to customize line parameters for specific circuit types, go to the sources indicated in the following table.

Line Type	**Go To**
Ethernet	Chapter 2
FDDI	Chapter 3
Token ring	Chapter 4
802.1Q tagged port	Chapter 5
ATM FRE®-2, ATM ARE	*Configuring ATM Services*
ATM DXI, E1, T1, HSSI, synchronous (serial), asynchronous, LAPB, MCE1, MCT1, FE1, and FT1	*Configuring WAN Line Services*

Chapter 2
Configuring Ethernet Services

This chapter describes how to customize the physical layer for Ethernet router interfaces. It includes the following information:

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Configuring Ethernet Services Using the BCC or Site Manager

Table 2-1 lists the Ethernet configuration tasks described in this chapter and indicates whether you can use the BCC or Site Manager to perform each task.

Table 2-1. Ethernet Configuration Tasks

Task	BCC	Site Manager
Enabling or Disabling an Ethernet Interface	✓	✓
Enabling or Disabling BofL Messages	✓	✓
Setting the BofL Timeout	✓	✓
Setting BofL Retries	✓	
Setting the BofL Timeout Divisor	✓	
Enabling or Disabling Hardware Filtering	✓	✓
Enabling or Disabling Hardware Filtering	✓	✓
Setting the Transmit Queue Length	✓	
Setting the Receive Queue Length	✓	
Setting the Interface Line Speed for 100BASE-T Modules		✓
Setting Line Advertising Capabilities for 100BASE-T Modules		✓
Enabling Ethernet Flow Control	✓	✓

About Nortel Networks Ethernet Media

The Nortel Networks Ethernet/802.3 interface supports IEEE 802.3 and Version 1.0/2.0 Ethernet frame formats. Ethernet circuits use carrier sense multiple access with collision detection (CSMA/CD) to manage access to the physical media in a baseband LAN.

10BASE-T interfaces operate at 10 megabits/second (Mb/s) over twisted wire or coaxial cable. 100BASE-T interfaces (sometimes called Fast Ethernet) operate at 100 Mb/s. Refer to the *Bay Networks Guide to Understanding 100BASE-T* for detailed information.

The following sections describe proprietary features of Nortel Networks Fast Ethernet router services, and provide hints and notes for operation.

100BASE-T Media

Each Nortel Networks 100BASE-T router port provides two physical connectors for LAN media:

- Media dependent interface (MDI): RJ-45 connector to integral transceiver
- Media independent interface (MII): DB-40 connector to an external transceiver

The connector you use determines the supported features of 100BASE-TX and 100BASE-FX operation (Table 2-2).

Table 2-2. 100BASE-T Features

Operation	Cabling	Physical Interface	Automatic Line Negotiation	Full Duplex *	Congestion Control *
100BASE-TX (MDI)	Category 5 unshielded twisted pair (UTP) copper	RJ-45 connector	Supported	Supported	Supported
100BASE-FX (MII)	Multimode fiber optic	DB-40 connector to external transceiver	Not supported	Supported	Not supported
100BASE-TX (MII)	UTP	DB-40 connector to external transceiver	Supported	Not supported	Not supported

* The current implementation of the Ethernet standard does not address full-duplex operation or congestion control; these are proprietary features.

100BASE-T Packet Size

When using the 100BASE-T link module, larger packet sizes yield better performance than smaller packet sizes. In general, you should configure your application to use the largest packet size possible.

Note: To obtain the highest aggregate throughput, use only one port on a 100BASE-T link module. Demanding high throughput from both ports simultaneously will result in some packet loss, which may decrease the performance of sensitive applications.

Enabling or Disabling an Ethernet Interface

The router enables CSMA/CD services when you add a 10 Mb/s or 100 Mb/s Ethernet circuit to the router configuration file.

You can disable and enable the Ethernet interface without moving physical cabling.

Using the BCC

To enable the Ethernet interface, access an existing Ethernet line service and enter:

enable

To disable the Ethernet interface, access an existing Ethernet line service and enter:

disable

For example, to enable an Ethernet interface, enter the following command sequence:

```
box# ethernet slot 13 connector 1
ethernet/13/1# enable
```

Using Site Manager

To enable or disable an Ethernet interface, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose an **XCVR** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit CSMA/CD Parameters window opens.
3. Set the **Enable** parameter. Click on **Help** or see the parameter description on page A-3.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Configuring BofL Messages

For carrier detection on Ethernet circuits, the router sends breath of life (BofL) messages whenever the interface transmitter is idle. When there is no data traffic, BofL messages signify that the Ethernet LAN is up and functioning normally.

These sections describe how to configure BofL transmissions:

- Enabling or Disabling BofL Messages
- Setting the BofL Timeout
- Setting BofL Retries
- Setting the BofL Timeout Divisor

With default values configured, the router declares an Ethernet interface down after 25 seconds (five retries of 5 seconds each) without a successful frame transmission.

Note: When you configure router redundancy on an Ethernet interface, Site Manager automatically adjusts BofL parameters to reduce the time it takes the router to declare an interface down when there is a loss of service. With default router redundancy values configured, the router declares the interface down after 2 seconds (four retries of .05 seconds each).

Enabling or Disabling BofL Messages

With BofL enabled, the router sends polling messages from this Ethernet interface to all systems on the local network.

Note: The router does not send BofL messages if it is already transmitting regular data traffic.

BofL messages are enabled by default on every Ethernet interface. You can disable and enable BofL messages on an interface.

Using the BCC

To enable BofL messages on an Ethernet interface, access an existing Ethernet line service and enter:

bofl enable

To disable BofL messages on an Ethernet interface, access an existing Ethernet line service and enter:

bofl disable

For example, to enable BofL messages, enter the following command sequence:

```
box# ethernet slot 13 connector 1
ethernet/13/1# bofl  enable
```

Using Site Manager

To enable or disable BofL messages, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose an **XCVR** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit CSMA/CD Parameters window opens.
3. Set the **BofL Enable** parameter. Click on **Help** or see the parameter description on page A-3.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Setting the BofL Timeout

With BofL enabled, a network timeout will occur if five periods elapse without a successful BofL message transmission. When timeout occurs, the router automatically disables and reenables the Ethernet interface. For example, if you set the BofL timeout interval to 10 seconds, the interface must successfully transmit a BofL message within 50 seconds.

The BofL timeout interval is 5 seconds by default. You can change the interval of BofL messages to a value from 1 to 60 seconds.

Using the BCC

To change the interval of BofL messages on an Ethernet interface, access an existing Ethernet line service and enter:

bofl-timeout *<integer>*

integer is the timeout value expressed in seconds. You can enter any integer value from 1 to 60.

For example, to set the timeout value to 10 seconds, enter the following command sequence:

```
box# ethernet slot 13 connector 1
ethernet/13/1# bofl-timeout 10
```

Using Site Manager

To change the interval of BofL messages, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose an **XCVR** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit CSMA/CD Parameters window opens.
3. Set the **BofL Timeout** parameter. Click on **Help** or see the parameter description on page A-3.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Note: In Site Manager, the BofL Timeout parameter is valid only if you set the BofL Enable parameter to Enable.

Setting BofL Retries

By default, the router makes five attempts to transmit a BofL message before declaring the Ethernet interface down. With router redundancy enabled, the default is four attempts.

You can specify the number of transmission attempts, from 1 to 60 retries, before the router declares the circuit down. You can only do this by using the BCC.

To specify the number of retransmission attempts, access an existing Ethernet line service and enter:

bofl-retries *<integer>*

integer is the number of BofL retries. You can accept the default value of 5 or enter any integer from 1 to 60.

Set the number of retransmission attempts in conjunction with the time period between transmission of BofL attempts and the BofL timeout period to decrease or increase the time it takes the router to declare an interface down.

For example, to set the number of BofL retries to 10, enter the following command sequence:

```
box# ethernet slot 13 connector 1
ethernet/13/1# bofl-retries 10
```

Setting the BofL Timeout Divisor

By default, the router uses the value you specify for the BofL timeout period to determine the time period between transmissions of BofL messages from an Ethernet interface. The actual interval between BofL transmissions is the value of the BofL timeout divided by the value of the BofL timeout divisor. When set to the default value of 1, the BofL timeout divisor has no effect on the BofL timeout value. When set to a value greater than 1, the BofL timeout divisor reduces the value of BofL timeout.

When you configure router redundancy on an interface, Nortel Networks recommends that you set the value of the BofL timeout divisor to 10 to reduce the time between BofL transmissions, which reduces the time it takes the router to declare a circuit down.

Set the value of this parameter to an integer from 2 to 100 if you want a BofL timeout to be detected in less than 1 second. Leave this parameter set to 1 and use the BofL Timeout parameter for 1- to 5-second timeout values.

For example, with the BofL timeout value set to 5 seconds and the BofL timeout divisor set to 10, the router sends a BofL message every 0.5 seconds (5 divided by 10). With BofL timeout set to 5 seconds and the BofL timeout divisor set to 1, transmissions are every 5 seconds.

To set the BofL timeout divisor, access an existing Ethernet line service and enter:

bofl-tmo-divisor *<integer>*

integer is a value from 2 to 100.

For example, to set the BofL timeout divisor to 15, enter the following command sequence:

```
box# ethernet slot 13 connector 1
ethernet/13/1# bofl-tmo-divisor  15
```

Enabling or Disabling Hardware Filtering

When you add an Ethernet circuit for a link module with hardware filter capability, hardware filtering is disabled by default.

With hardware filtering enabled, the Ethernet interface drops local frames instead of copying them into system memory to be processed by the bridge software. *Local frames* are frames that contain both destination and source MAC addresses that the router has learned on the interface. Bridge software teaches the hardware filter which MAC addresses are local to an interface.

Enabling hardware filtering improves bridging software performance, since the router software does not need to determine whether to receive and reject local frames.

You can enable or disable hardware filtering on an interface. Enable hardware filtering only if the Ethernet link module has hardware filters and you enabled bridge software.

Using the BCC

To enable hardware filtering, access an existing Ethernet line service and enter:

hardware-filter enable

To disable hardware filtering, access an existing Ethernet line service and enter:

hardware-filter disable

For example, to enable hardware filtering, enter the following command sequence:

```
box# ethernet slot 13 connector 1
ethernet/13/1# hardware-filter enable
```

Using Site Manager

To enable or disable hardware filtering, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose an **XCVR** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit CSMA/CD Parameters window opens.
3. Set the **Hardware Filter** parameter. Click on **Help** or see the parameter description on page A-5.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Setting the Transmit Queue Length

The transmit queue length determines the number of buffers that can be used to transmit data. Set the value from 0 to 255 to determine the transmit queue length. If you set the value larger than the compiled ring size, the router will truncate the value at that size.

To set the transmit queue length, access an existing Ethernet line service and enter:

transmit-queue-length *<integer>*

integer is a value from 0 to 255.

For example, to set the transmit queue length to 100, enter the following command sequence:

```
box# ethernet slot 13 connector 1
ethernet/13/1# transmit-queue-length 100
```

Setting the Receive Queue Length

The receive queue length determines the number of buffers that can be used to receive data. Set the value from 0 to 255 to determine the receive queue length. If you set the value larger than the compiled ring size, the router will truncate the value at that size.

To set the receive queue length, access an existing Ethernet line service and enter:

receive-queue-length *<integer>*

integer is a value from 0 to 255.

For example, to set the receive queue length to 100, enter the following command sequence:

```
box# ethernet slot 13 connector 1
ethernet/13/1# receive-queue-length 100
```

Setting the Interface Line Speed for 100BASE-T Modules

When you enable Ethernet line services on a 100BASE-T module, you can set the line speed and duplex setting or enable automatic line negotiation.

To set the interface line speed and duplex setting or to enable automatic line negotiation, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose an **XCVR** Connector (100BASE-T only).	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit CSMA/CD Parameters window opens.
3. Set the **Interface Line Speed** parameter. Click on **Help** or see the parameter description on page A-8.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Setting Line Advertising Capabilities for 100BASE-T Modules

When you enable Ethernet line services on a 100BASE-T module, you can specify the line configurations available to remote nodes that have automatic line negotiation capability.

To set the line advertising capabilities, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose an **XCVR** Connector (100BASE-T only).	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit CSMA/CD Parameters window opens.
3. Set the **Interface Line Speed** parameter to **Auto Negotiation**. Click on **Help** or see the parameter description on page A-8.	
4. Click on **OK**.	The Auto Negotiation Configuration window opens.
5. Click on **Configure Line Capabilities**.	The Auto Neg Advertising Capabilities window opens.
6. Set the **Line Advertising Capabilities** parameter. Click on **Help** or see the parameter description on page A-9.	
7. Click on **OK**.	You return to the Auto Negotiation Configuration window.
8. Click on **Done**.	You return to the Edit Connector window.
9. Click on **Done**.	You return to the Configuration Manager window.

Enabling Ethernet Flow Control

Ethernet flow control allows you to temporarily stop a remote station from sending packets to prevent packet loss in a congested system. Ethernet flow control is supported on BN platforms for the following boards:

- Quad 100BASE-TX
- Quad 100BASE-FX
- Gigabit Ethernet-SX
- Gigabit Ethernet-LX

The Nortel Networks implementation of flow control uses MAC control frames. These frames have a unique value of 8808H in the length/type field. They differ from typical Ethernet packets in that the data field consists of an opcode field and a parameter field. The opcode field contains the opcode command Pause; the parameter field defines the pause time. When the receive station detects a MAC control frame with a Pause opcode, the remote transmitter pauses for a time interval equal to the pause time * 512 bit times. The value 512 bit times converts to 51.2 microseconds (ms) for 10 Mb/s, 5.12 ms for 100 Mb/s, and 512 nanoseconds (ns) for Gigabit.

When a transmitter receives a MAC control frame, it stops sending packets for the specified time. You can configure the congested receiver (the sender of the MAC control frame) to transmit a pause frame with a pause time of 0 when the receiver is no longer congested, thereby causing the remote transmitter to resume sending packets. You do this by setting the Transmit Pause Zero Enable (Site Manager) parameter or the pause-zero-enable (BCC) parameter to Enable.

The following sections describe how to use the BCC and Site Manager to enable Ethernet flow control.

Using the BCC

You enable or disable flow control using the fc-enable parameter. However, this parameter is affected by the value of another parameter, speed-select. You access the speed-select parameter by navigating to the auto-neg prompt (for example, **box**; **ethernet 2/1**; **auto-neg**). Based on the value of the speed-select parameter, the BCC either ignores or accepts the setting of the fc-enable parameter.

If you set the speed-select parameter to auto-negotiation, you must use the fc-enable parameter to enable or disable flow control. The BCC ignores the setting of the advertised-capabilities parameter, which you use to specify the line configuration available to remote nodes that have automatic line negotiation capability. You access the advertised-capabilities parameter by navigating to the auto-neg prompt (for example, **box**; **ethernet 2/1**; **auto-neg**).

For example, navigate to an Ethernet prompt (**box**; **ethernet 2/1**) and enter:

```
ethernet/2/1# fc-enable enabled
ethernet/2/1# auto-neg
auto-neg/2/1# speed-select auto-negotiation
auto-neg/2/1#
```

However, if the interface speed is in fixed mode (that is, not set to auto-negotiation), flow control is enabled or disabled based on the value of the speed-select parameter.

If you set the speed-select parameter to 100base-x-fd, flow control is automatically disabled, and the BCC ignores the setting of the fc-enable parameter. For example, navigate to an Ethernet prompt (**box**; **ethernet 2/1**) and enter:

```
ethernet/2/1# auto-neg
auto-neg/2/1# speed-select 100base-x-fd
auto-neg/2/1#
```

If you set the speed-select parameter to 100base-x-fd-cong, flow control is automatically enabled, and the BCC ignores the value of the fc-enable parameter. For example, navigate to an Ethernet prompt (**box**; **ethernet 2/1**) and enter:

```
ethernet/2/1# auto-neg
auto-neg/2/1# speed-select 100base-x-fd-cong
auto-neg/2/1#
```

If you enable flow control using the fc-enable command, you can set the parameters described in Table 2-3:

Table 2-3. BCC Flow Control Parameters

Parameter/Variable	Description
fc-pause-time *<pause_time>*	This variable lets you calculate the total time a transmitter pauses. For example, when a transmitter receives a pause frame, it pauses for *pause_time* * 512 bit times. (The value 512 bit times converts to 51.2 ms for 10 Mb/s, 5.12 ms for 100 Mb/s, and 512 ns for Gigabit.) Therefore, if the pause time is 65535 and the line speed is 100 Mb/s, then the transmitter pauses for 335.54 ms (65535 * 5.12 ms).
pause-zero-enable *<state>*	This variable lets you enable or disable the ability of a congested receiver to send a pause frame with a pause time of 0 when the receiver is no longer congested. When the remote transmitter receives a pause frame with a 0 pause time, it resumes sending packets.

For example, to specify a transmitter pause time of 65535, enter the following commands:

```
ethernet/2/1# fc-pause-time 65535
ethernet/2/1# pause-zero-enable enable
ethernet/2/1#
```

Using Site Manager

To enable flow control, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose an **XCVR** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit 10/100MB/s Ethernet Parameters window or the Edit 1000 Mb/s Ethernet Parameters window opens, depending on the module you selected.
3. Set the following parameters: • **Flow Control Enable** • **Flow Control Pause Time** • **Transmit Pause Zero Enable** Click on **Help** or see the parameter descriptions beginning on page A-14.	
4. Click on **OK**.	The Edit Connector window opens. **Note:** If the Interface Line Speed parameter is set to Auto Negotiation, the Auto Negotiation window opens. Click on **Done** to go to the Edit Connector window.
5. Click on **Done**.	The Configuration Manager window opens.

Chapter 3
Configuring FDDI Services

This chapter describes how to customize the physical and link layers for FDDI interfaces. It includes the following information:

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About Nortel Networks FDDI Media	3-3
Enabling or Disabling a FDDI Interface	3-3
Enabling or Disabling BofL Messages	3-4
Setting the BofL Interval	3-6
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Editing FDDI Port Attributes	3-23
Setting the Transmit Queue Length	3-25
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Configuring FDDI Services Using the BCC or Site Manager

Table 3-1 shows the FDDI configuration tasks described in this chapter and indicates whether you can use the BCC or Site Manager to perform each task.

Table 3-1. FDDI Configuration Tasks

Task	BCC	Site Manager
Enabling or Disabling a FDDI Interface	✓	✓
Enabling or Disabling BofL Messages	✓	✓
Setting the BofL Interval	✓	✓
Enabling or Disabling Hardware Filtering	✓	✓
Specifying the SMT Connection Policy	✓	✓
Specifying the Neighbor Notification Interval	✓	✓
Specifying the Propagation Expiration Time	✓	✓
Enabling or Disabling Status Report Frames		✓
Enabling or Disabling Duplicate Addressing	✓	✓
Entering User Data		✓
Enabling or Disabling MAC LLC		✓
Specifying the Minimum TVX		✓
Specifying the Maximum TTRT		✓
Specifying the Requested TTRT		✓
Specifying the LER Cutoff		✓
Specifying the LER Alarm Rate		✓
Setting the Transmit Queue Length	✓	
Setting the Receive Queue Length	✓	

About Nortel Networks FDDI Media

Fiber Distributed Data Interface (FDDI) comprises a set of ANSI/ISO standards that define a 100 Mb/s, timed token-passing LAN of up to 500 nodes. FDDI is used most often for workgroup, backbone, and backend network configurations that require high bandwidth and performance.

Nortel Networks provides FDDI interfaces for multimode or single-mode 100 Mb/s FDDI LANs, including hybrid FDDI link modules for both single-mode and multimode fiber interfaces.

All FDDI interfaces support a Class A dual attachment or a dual-homing Class B single attachment. The FDDI link and net modules include two Media Interface Connector (MIC) plugs as well as one RJ-11 connector for attachment to an optional external optical bypass unit.

Enabling or Disabling a FDDI Interface

The router enables FDDI line services when you add the interface. You can disable and enable the interface without moving physical cables.

Using the BCC

To enable a FDDI interface, start by accessing an existing FDDI line service and enter:

enable

To disable a FDDI interface, access an existing FDDI line service and enter:

disable

For example, to enable a FDDI interface, enter the following command sequence:

```
box# fddi slot 11 connector 1
fddi/11/1# enable
```

Using Site Manager

To disable or reenable a FDDI interface, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Set the **Enable** parameter. Click on **Help** or see the parameter description on page page A-17.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Enabling or Disabling BofL Messages

With BofL enabled, the router sends polling messages from this interface to all systems on the local network. BofL messages signify that the FDDI interface is up and functioning normally when there is no data traffic.

If the link becomes unavailable and both this parameter and the LLC Data Enable parameter are enabled, the router disables the LLC interface after the time you specify using the BofL Timeout parameter. When you set this parameter to Disable, the router disables the Logical Link Control (LLC) interface immediately after the link becomes unavailable.

By default, BofL messages are enabled when you add the circuit. You can disable and reenable BofL messages on a FDDI interface.

Using the BCC

To enable BofL on a FDDI interface, access an existing FDDI line service and enter:

bofl enable

To disable BofL on a FDDI interface, access an existing FDDI line service and enter:

bofl disable

For example, to enable BofL on a FDDI interface, enter the following command sequence:

```
box# fddi slot 11 connector 1
fddi/11/1# bofl enable
```

Using Site Manager

To disable or reenable BofL messages on a FDDI interface, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector**.**	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Set the **BofL Enable** parameter. Click on **Help** or see the parameter description on page A-18.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Setting the BofL Interval

The BofL interval is the amount of time the router waits before disabling the LLC interface when the link becomes unavailable and BofL is enabled.

By default, the BofL interval is 5 seconds. You can change the interval of BofL messages to a value from 1 to 60 seconds.

Using the BCC

To change the interval of BofL messages, access an existing FDDI line service and enter:

bofl-timeout *<integer>*

integer is the timeout value expressed in seconds. You can enter any integer value from 0 to 3600.

For example, to change the BofL interval to 10, enter the following command sequence:

```
box# fddi slot 11 connector 1
fddi/11/1# bofl-timeout  10
```

Using Site Manager

To change the interval of BofL messages, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose Edit Line.	The Edit FDDI Parameters window opens.
3. Set the **BofL Timeout** parameter. Click on Help or see the parameter description on page A-18.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Enabling or Disabling Hardware Filtering

When you add a FDDI circuit for a link module with hardware filtering capability, hardware filtering is disabled by default.

With hardware filtering enabled, the FDDI interface drops local frames instead of copying them into system memory to be processed by the bridge software. *Local frames* are frames that contain both destination and source media access control (MAC) addresses that the router has learned on the interface. Bridge software teaches the hardware filter which MAC addresses are local to an interface.

Enabling hardware filtering improves bridging software performance, because the router software does not need to determine whether to receive and reject local frames.

You can enable or disable hardware filtering on an interface. Enable hardware filtering only if the FDDI link module has hardware filters and you enabled bridge software.

Using the BCC

To enable hardware filtering, access an existing FDDI line service and enter:

hardware-filter enable

To disable hardware filtering, access an existing FDDI line service and enter:

hardware-filter disable

For example, to enable hardware filtering, enter the following command sequence:

```
box# fddi slot 11 connector 1
fddi/11/1# hardware-filter enable
```

Using Site Manager

To enable or disable hardware filtering on a FDDI interface, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Set the **Hardware Filter** parameter. Click on **Help** or see the parameter description on page A-19.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Editing FDDI SMT Attributes

The FDDI Station Management (SMT) standard defines the protocols for managing the Physical Layer Media Dependent (PMD), the Physical Layer protocol (PHY), and the media access control (MAC) components of FDDI. The SMT protocols monitor and control the activity of each node on the ring. Nortel Networks routers support Version 7.2 of the SMT protocol. SMT contains three components:

- Connection management (CMT)
- Ring management (RMT)
- SMT frame services

Caution: Changing any of the FDDI Advanced Attributes parameters affects the operation of your FDDI network. Before modifying these parameters, you should understand how to use them to improve network performance.

The following sections describe how you can configure SMT.

Specifying the SMT Connection Policy

A FDDI station sets the corresponding policy for each of the connection types that it wants to reject. The policy descriptor takes the form “rejectX-Y” where X denotes the physical connection (PC) type of the local port, and Y denotes the PC type of the neighbor port.

X and Y can have the following values:

- A -- Indicates that the port is a dual-attachment station or concentrator that attaches to the primary IN and the secondary OUT when attaching to the dual FDDI ring
- B -- Indicates that the port is a dual-attachment station or concentrator that attaches to the secondary IN and the primary OUT when attaching to the dual FDDI ring
- S -- Indicates a port in a single-attachment station or concentrator
- M -- Indicates a port in a concentrator that serves as a master to a connected station or concentrator

To set the connection policies that you want this line to reject, you specify a status word with a value from 0x0 to 0xFFFF.

Use the following formula to determine the value of the status word:

1. Start with a value of 0 for the status word (all bits set to 0).
2. For each connection policy that you want the node to reject, add to the status word value the number 2 raised to a power specified in Table 3-2. This is equivalent to setting a bit to 1 for each policy that you want the node to reject.

You set the status word value to reflect local connection policies. Setting a particular connection policy does not necessarily mean that the station will reject the connection. The SMT standard requires that both sides of the connection must agree to reject, or else *both* sides must accept, the connection.

Note: The SMT standard requires that you set bit 15 (rejectM-M) to 1.

Table 3-2 lists the powers and the bits for each policy range.

Table 3-2. SMT Connection Policy Values

Policy	Power (Bit Number)	Policy	Power (Bit Number)
rejectA-A	0	rejectS-A	8
rejectA-B	1	rejectS-B	9
rejectA-S	2	rejectS-S	10
rejectA-M	3	rejectS-M	11
rejectB-A	4	rejectM-A	12
rejectB-B	5	rejectM-B	13
rejectB-S	6	rejectM-S	14
rejectB-M	7	rejectM-M	15

Figure 3-1 shows the default connection policy, status word 0xFF65.

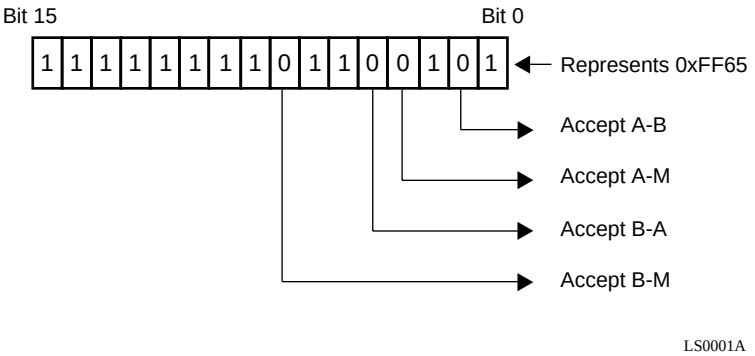

Figure 3-1. Default Connection Policy Status Word

Using the BCC

To set the SMT Connection Policy, access an existing FDDI line service and enter:

reject-policy *<legal_value>*

legal_value is any of the values listed in Table 3-2.

For example, to set the SMT connection policy, enter the following command sequence:

```
box# fddi slot 11 connector 1
fddi/11/1# reject-policy a-a
```

Using Site Manager

To set the SMT connection policy, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **SMT Attributes**.	The FDDI SMT Attributes window opens.
5. Set the **Connection Policy** parameter. Click on **Help** or see the parameter description on page A-20.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Specifying the Neighbor Notification Interval

Neighbor information frames (NIFs) identify the upstream and downstream neighbors of each node. A Nortel Networks station issues a response to the sender of a NIF frame and generates NIF requests as part of the neighbor notification process.

You can set the interval between successful iterations of the Neighbor Notification Protocol on an interface to a value from 2 to 30 seconds. By default, the interval is 22 seconds. This interval:

- Determines the MAC addresses of the upstream and downstream neighbors

- Detects duplicate MAC addresses on the ring
- Generates periodic “keepalive” traffic that verifies the local MAC transmit and receive paths

Using the BCC

To set the neighbor notification interval, access an existing FDDI line service and enter:

neighbor-notify-time *<integer>*

integer is the neighbor notification interval value expressed in seconds. You can enter any integer value from 2 to 30.

For example, to set the neighbor notification interval to 10, enter the following command sequence:

```
box# fddi slot 11 connector 1
fddi/11/1# neighbor-notify-time  10
```

Using Site Manager

To set the neighbor notification interval, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **SMT Attributes**.	The FDDI SMT Attributes window opens.
5. Set the **T_Notify Timeout** parameter. Click on **Help** or see the parameter description on page A-20.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Specifying the Propagation Expiration Time

A trace is a diagnostic function that isolates a fault on the ring. By default, the maximum propagation time for a trace on a FDDI topology is 7 seconds. You can set the propagation expiration time to a value from 6001 to 256000 milliseconds (ms).

Using the BCC

To set the propagation expiration time, access an existing FDDI line service and enter:

token-rotation-time *<integer>*

integer is the propagation expiration time expressed in seconds.

For example, to set the propagation expiration time to 10, enter the following command sequence:

```
box# fddi slot 11 connector 1
fddi/11/1# token-rotation-time  10
```

Using Site Manager

To set the propagation expiration time, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector**.**	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **SMT Attributes**.	The FDDI SMT Attributes window opens.
5. Set the **Trace Max Expiration (ms)** parameter. Click on **Help** or see the parameter description on page A-21.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Enabling or Disabling Status Report Frames

Status report frames (SRFs) allow the Status Report protocol to report node conditions and events. A *condition* occurs when a node enters a specific state (for example, duplicate address detected). An *event* is an immediate occurrence (for example, the generation of a trace).

By default, the FDDI line generates an SRF announcement frame for its implemented events (for example, high bit errors, topology changes, trace status events, MAC frame error condition, and MAC duplicate address condition). Nortel Networks recommends enabling SRFs to ensure that your FDDI network is ANSI-compliant.

To disable or reenable SRFs for this circuit, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **SMT Attributes**.	The FDDI SMT Attributes window opens.
5. Set the **Status Report Protocol** parameter. Click on **Help** or see the parameter description on page A-21.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Enabling or Disabling Duplicate Addressing

By default, the router implements an optional ANSI duplicate address test involving periodic transmission of Network Service Address Network Interface Function (NSA NIF) frames to the source.

You can disable or enable duplicate addressing on an interface.

Using the BCC

To enable duplicate addressing on an interface, access an existing FDDI line service and enter:

promiscuous enable

To disable duplicate addressing on an interface, access an existing FDDI line service and enter:

promiscuous disable

For example, to enable duplicate addressing, enter the following command sequence:

```
box# fddi slot 11 connector 1
fddi/11/1# promiscuous enable
```

Using Site Manager

To disable or reenable duplicate addressing on an interface, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **SMT Attributes**.	The FDDI SMT Attributes window opens.
5. Set the **Duplicate Address Protocol** parameter. Click on **Help** or see the parameter description on page A-22.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Entering User Data

You can enter up to 32 alphanumeric characters of site-specific information to be attached to the status information frames (SIFs) on this interface.

To enter information to be attached to the SIFs on this interface, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector**.**	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **SMT Attributes**.	The FDDI SMT Attributes window opens.
5. Set the **User Data** parameter. Click on **Help** or see the parameter description on page A-21.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Editing the MAC LLC Attributes

The FDDI media access control (MAC) standard defines the timed-token protocol, frame and token construction and transmission on the FDDI ring, ring initialization, and fault isolation.

Enabling or Disabling MAC LLC

When the ring becomes operational, the FDDI interface exchanges Logical Link Control (LLC) protocol data units (PDUs) between the MAC and the local LLC entity. You can enable or disable transmission of PDUs on an interface only by using Site Manager.

Note: Enabling or disabling transmission of PDUs does not affect transferring and receiving MAC or SMT frame types.

To disable or reenable transmission of PDUs on an interface, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **MAC Attributes**.	The FDDI MAC Attributes window opens.
5. Set the **LLC Data Enable** parameter. Click on **Help** or see the parameter description on page A-22.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Editing FDDI Path Attributes

FDDI nodes exchange frames using the Timed-Token Protocol (TTP). The TTP defines how the token target rotation time (TTRT) is set, the length of time a node can hold the token, and how a node initializes the ring.

Each node is responsible for monitoring the integrity of the ring. By using a minimum valid transmission timer (TVX), nodes can detect a break in ring activity. If the interval between token receptions exceeds the value of the TVX, the node reports an error condition and initiates the claim process to restore ring operation.

The TTRT carried in claim frames issued by the FDDI station are known as path attributes. Figure 3-2 illustrates their relationship.

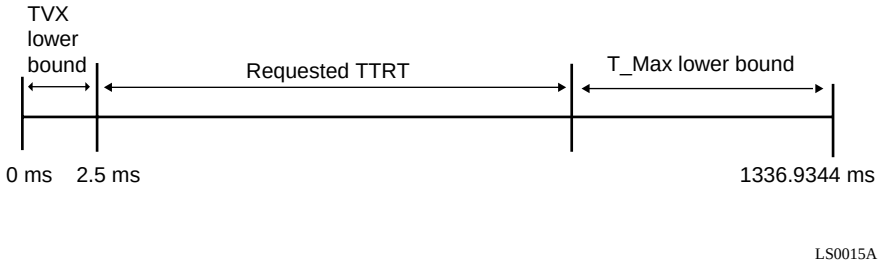

Figure 3-2. Range of Values for FDDI Path Attributes

You can set FDDI path attributes by:

- Specifying the minimum TVX
- Specifying the maximum TTRT
- Specifying the requested TTRT

Specifying the Minimum TVX

The minimum TVX must be:

- Greater than 0
- Less than the requested TTRT value

By default, the minimum TVX is 2.5 ms. See Figure 3-2 on page 3-19 for the range of values for TVX lower bound, in relation to the other TTRT parameters.

To set the minimum TVX, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **Path Attributes**.	The FDDI Path Attributes window opens.
5. Set the **Tvx Lower Bound (ms)** parameter. Click on **Help** or see the parameter description on page A-23.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Specifying the Maximum TTRT

The maximum TTRT value must be:

- Greater than or equal to 10 ms
- Greater than or equal to the value of the requested TTRT
- Less than or equal to 1336.9344 ms

See Figure 3-2 on page 3-19 for the range of values for the maximum TTRT, in relation to the other TTRT values.

To set the maximum TTRT value, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **Path Attributes**.	The FDDI Path Attributes window opens.
5. Set the **T_Max Lower Bound (ms)** parameter. Click on **Help** or see the parameter description on page A-23.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Specifying the Requested TTRT

The requested TTRT value must be:

- Greater than the minimum TVX
- Less than or equal to the maximum TTRT

Caution: Be extremely careful when editing FDDI path parameters such as Requested TTRT. Change the default values only if the network is part of a production or other specialized environment that requires customizing the parameters.

Refer to Figure 3-2 on page 3-19 for the valid range of values for requested TTRT, in relation to the other TTRT values.

To set the requested TTRT value, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **Path Attributes**.	The FDDI Path Attributes window opens.
5. Set the **Requested TTRT (ms)** parameter. Click on **Help** or see the parameter description on page A-24.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Editing FDDI Port Attributes

Port attributes report the connection capabilities of a FDDI port, including the link error rate (LER).

A status report frame (SRF) can contain link error monitoring (LEM) status indicating the number of times that a link has been rejected. This is used to keep track of the link error rate (LER).

You can configure the LER by:

- Specifying the LER cutoff
- Specifying the LER alarm rate

Specifying the LER Cutoff

The LER cutoff is an estimate at which a link connection will be broken. The LER cutoff ranges from 10^{-4} to 101^{-5} and is reported as the absolute value of the base 10 logarithm. By default, the LER cutoff is 10^{-7}.

To set the LER cutoff, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **Port Attributes**.	The FDDI Port Attributes window opens.
5. Set the **LER Cutoff** parameter. Click on **Help** or see the parameter description on page A-24.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Specifying the LER Alarm Rate

The LER alarm rate is an estimate at which a link connection generates an alarm. The LER alarm ranges from 10^{-4} to 10^{-15} and is reported as the absolute value of the base 10 logarithm of the estimate. By default, the LER alarm is 10^{-8}.

To set the LER alarm rate, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **FDDI** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit FDDI Parameters window opens.
3. Choose **Expert**.	The FDDI Advanced Attributes window opens.
4. Choose **Port Attributes**.	The FDDI Port Attributes window opens.
5. Set the **LER Alarm** parameter. Click on **Help** or see the parameter description on page A-24.	
6. Click on **OK**.	You return to the FDDI Advanced Attributes window.
7. Click on **Done**.	You return to the Edit Connector window.
8. Click on **Done**.	You return to the Configuration Manager window.

Setting the Transmit Queue Length

The transmit queue length determines the number of buffers that can be used to transmit data. Set the value from 0 to 255 to determine the transmit queue length. If you set the value larger than the compiled ring size, the router will truncate the value at that size.

To set the transmit queue length, access an existing FDDI line service and enter:

transmit-queue-length *<integer>*

integer is a value from 0 to 255.

For example, to set the transmit queue length to 100, enter the following command sequence:

```
box# fddi slot 11 connector 1
fddi/11/1# transmit-queue-length 100
```

Setting the Receive Queue Length

The receive queue length determines the number of buffers that can be used to receive data. Set the value from 0 to 255 to determine the receive queue length. If you set the value larger than the compiled ring size, the router will truncate the value at that size.

To set the receive queue length, access an existing FDDI line service and enter:

receive-queue-length *<integer>*

integer is a value from 0 to 255.

For example, to set the receive queue length to 100, enter the following command sequence:

```
box# fddi slot 11 connector 1
fddi/11/1# receive-queue-length 100
```

Chapter 4
Configuring Token Ring Services

This chapter describes how to customize the physical and link layers for token ring interfaces. It includes the following information:

Topic	Page
Configuring Token Ring Services Using the BCC or Site Manager	4-2
About Nortel Networks Token Ring Media	4-2
Enabling or Disabling a Token Ring Interface	4-3
Specifying a MAC Address Override	4-4
Specifying a MAC Address Source	4-5
Specifying the Ring Speed	4-6
Enabling or Disabling Early Token Release	4-7

Configuring Token Ring Services Using the BCC or Site Manager

Table 4-1 lists the token ring configuration tasks described in this chapter and indicates whether you can use the BCC or Site Manager to perform each task.

Table 4-1. Token Ring Configuration Tasks

Task	BCC	Site Manager
Enabling or Disabling a Token Ring Interface	✓	✓
Specifying a MAC Address Override		✓
Specifying a MAC Address Source		✓
Specifying the Ring Speed	✓	✓
Enabling or Disabling Early Token Release		✓

About Nortel Networks Token Ring Media

Token ring is a 4 or 16 Mb/s token-passing, baseband LAN that operates in a ring topology that conforms to the IEEE 802.5 standard. It is compatible with IEEE 802.2 Type 1 (connectionless) and Type 2 (connection-oriented) support.

A token ring LAN uses shielded or unshielded twisted pair cable; the interface supports IBM Type 1 and Type 3 cabling.

Enabling or Disabling a Token Ring Interface

The router enables token ring line services when you add the circuit. You can disable and enable the interface without moving physical cabling.

Using the BCC

To enable token ring line services, access an existing token ring line service and enter:

enable

To disable token ring line services, access an existing token ring line service and enter:

disable

For example, to enable a token ring interface, enter the following command sequence:

```
box# tokenring slot 9 connector 1
tokenring/9/1# enable
```

Using Site Manager

To enable or disable a token ring interface, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **TOKEN** Connector**.**	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit Token Ring Parameters window opens.
3. Set the **Enable** parameter. Click on **Help** or see the parameter description on page page A-25.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Specifying a MAC Address Override

To specify a MAC address for an interface (for example, to avoid host number conflicts on a directly connected IPX or XNS network), enter the 48-bit MAC address in MSB format; that is, enter 0x followed by 12 hexadecimal digits.

If you want the router to generate the MAC address for this token ring interface, do not change this parameter from its default value of 0.

If you enter a MAC address with this parameter, you must set the MAC Address Source to CNFG, as described in "Specifying a MAC Address Source," on page 4-5.

To specify a MAC address override, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **TOKEN** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit Token Ring Parameters window opens.
3. Set the **MAC Address Override** parameter. Click on **Help** or see the parameter description on page A-26.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Specifying a MAC Address Source

By default, the token ring interface uses the MAC address stored in the programmable read-only memory (PROM) on the link module.

You can set the source for MAC addresses on a token ring interface to:

- BOXWIDE -- The interface uses a MAC address that the software generates from the router's serial number.
- PROM -- The interface uses a MAC address from the PROM on the token ring link module.
- CNFG -- You explicitly assign a MAC address with the MAC Address Override parameter.

To set the source for MAC addresses, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **TOKEN** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit Token Ring Parameters window opens.
3. Set the **MAC Address Select** parameter. Click on **Help** or see the parameter description on page A-26.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Specifying the Ring Speed

You can set the ring speed for a token ring interface to 4 or 16 Mb/s. By default, the ring speed is 16 Mb/s.

If you use 16 Mb/s, the router enables the early token release protocol, which is used extensively on 16 Mb/s media. In the unlikely event that you want to disable early token release over 16 Mb/s token ring media, disable early token release as described in the next section.

Using the BCC

To set the ring speed for a token ring interface, access an existing token ring line service and enter:

speed *<value>*

value is either 4 or 16.

For example, to set the ring speed to 16 Mb/s, enter the following command sequence:

```
box# tokenring slot 9 connector 1
tokenring/9/1# speed 16
```

Using Site Manager

To set the ring speed, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **TOKEN** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit Token Ring Parameters window opens.
3. Set the **Speed** parameter. Click on **Help** or see the parameter description on page A-27.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Enabling or Disabling Early Token Release

Early token release indicates that the token can return to the ring before the recipient copies all data. By default, Site Manager enables early token release on an interface.

You can disable or enable early token release on an interface only when the ring speed is 16 Mb/s.

To enable or disable early token release, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose a **TOKEN** Connector.	The Edit Connector window opens.
2. Choose **Edit Line**.	The Edit Token Ring Parameters window opens.
3. Set the **Early Token Release** parameter. Click on **Help** or see the parameter description on page A-27.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Chapter 5
Configuring 802.1Q Tagging

This chapter provides an overview of 802.1Q tagging and instructions for configuring it on a router. It includes the following information:

Topic	Page
Virtual LAN Overview	5-1
802.1Q Tagging	5-6
Router Processing of Tagged Frames	5-7
Implementation Considerations	5-8
Adding a Tagged Circuit to an Unconfigured 100BASE-T Interface	5-8
Adding a Tagged Circuit to an Existing 100BASE-T Interface	5-10
Editing a Tagged Circuit	5-11
Disabling a Tagged Circuit	5-12
Deleting a Tagged Circuit	5-12

Virtual LAN Overview

Traditional LANs are defined by physical media:

- Early first-generation LANs were defined by the cable or fiber that connected workstations.
- Later second-generation LANs, or LAN segments, are defined by the concentrators, repeaters, or hubs (all physical layer, or layer 1, devices) that connect workstations.

Traditional LANs are connected by bridges at layer 2 or by routers at layer 3.

Modern, intelligent switching devices have enabled the construction and interconnection of virtual LANs (VLANs). The term *VLAN* is generally understood to mean the following:

- A VLAN is a flexible, software-defined logical group of devices; VLAN boundaries are independent of the physical media.

  Figure 5-1 shows a second-generation network topology with a bridge connecting four LANs or LAN segments, and the same physical topology with an intelligent switching device (such as one of the Accelar™ family of routing switches) providing connectivity.

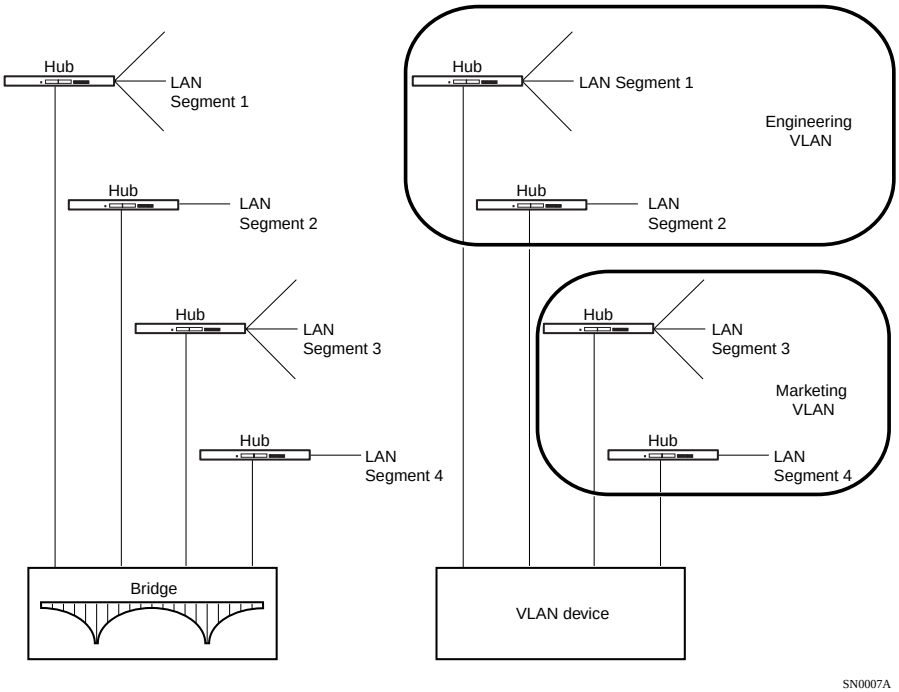

Figure 5-1. VLAN Topology

As illustrated in Figure 5-1, the four VLAN segments can be reconfigured as two VLANs: the Engineering VLAN, consisting of LAN segments 1 and 2, and the Marketing VLAN, consisting of LAN segments 3 and 4.

- A VLAN contains broadcast traffic within software-defined boundaries.

  With reference to Figure 5-1, broadcast traffic within the bridged topology is propagated across all physical interfaces. For example, a broadcast frame originated by a workstation on LAN segment 1 is forwarded to LAN segments 2, 3, and 4. In contrast, within the VLAN topology, a broadcast frame originated by a workstation on LAN segment 1 is forwarded only to LAN segment 2. Broadcast traffic is confined with the bounds of the VLAN.

- A VLAN provides low-latency, wire-speed communication between VLAN members.

  All members of the Engineering VLAN, for example, communicate at wire speed whether they are physically connected to LAN segment 1 or 2.

- A VLAN supports network segmentation or microsegmentation; a VLAN segment can consist of one or many workstations.

- A VLAN is a closed bridge group, with boundaries enforced by spanning tree protocols.

- Intra-VLAN communication is provided by layer 2 switching.

- Inter-VLAN communication requires additional layer 3 services. Layer 3 services may be provided by the VLAN device or by an adjacent router.

Intra-VLAN Traffic Flow

Intra-VLAN traffic (where the frame source and the frame destination are both on the same VLAN) is forwarded at layer 2 by the VLAN device. Forwarding decisions are based on layer 2 forwarding tables that associate specific MAC/layer 2 addresses with specific device ports.

Inter-VLAN Traffic Flow

Inter-VLAN traffic (where the frame source and the frame destination are not on the same VLAN) requires layer 3 (routing) services. Certain advanced platforms (such as the Accelar family of routing switches) can provide these services.

More commonly, however, routing services are provided by an adjacent router, as shown in Figure 5-2, where frames originating on the Marketing VLAN and destined for the Sales VLAN are switched across a dedicated port by the VLAN device to the attached router. The router, operating at layer 3, redirects the frame across another dedicated port to the VLAN device, which in turns switches the frame at layer 2 to the recipient VLAN.

The configuration illustrated in Figure 5-2 is inefficient for both the router and the VLAN device, because it requires a dedicated port for each VLAN. In network topologies that support multiple VLANs, the costs for dedicated ports may be prohibitive.

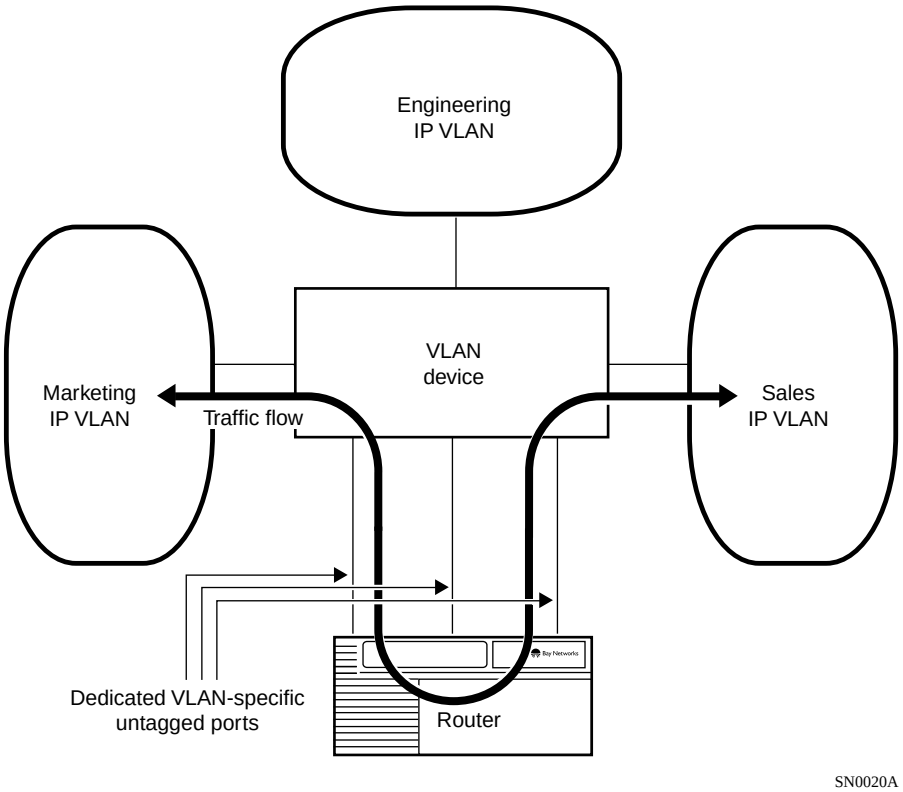

Figure 5-2. Connecting VLANs Using a Router

In contrast, Figure 5-3 depicts a topology in which the same three VLANs share a common connection to the adjacent router. This common connection is enabled by a packet encapsulation format specified in IEEE 802.1Q, *Draft Standard for Virtual Bridged Local Area Networks*. This packet encapsulation format is referred to as *802.1Q tagging*.

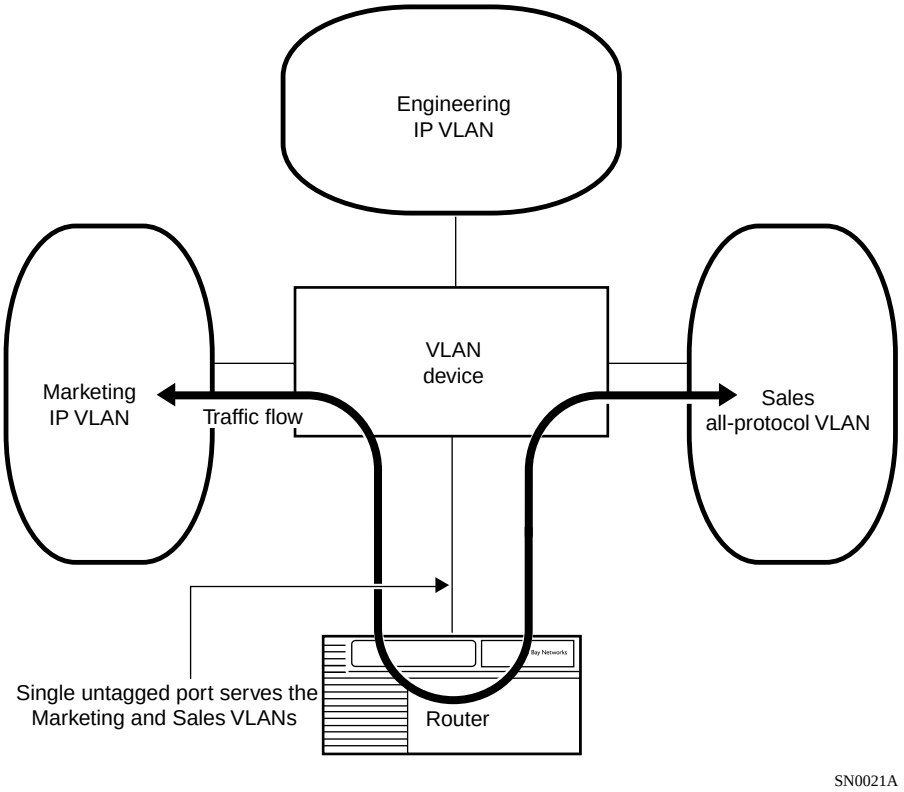

Figure 5-3. Connecting VLANs Using 802.1Q Tagging

802.1Q Tagging

802.1Q tagging enables multiple VLANs to share a common connection to a router. The router provides layer 3 routing services for the VLAN clients. The router may provide standard routing services, that is, directing received frames toward a remote destination; or it may function as a so-called “one-armed” router, returning frames to the device from which it received them, but forwarding them to a different logical entity.

Shared usage of a common physical port (often referred to as a *tagged* port) is facilitated by the addition of two 2-byte fields within the standard Ethernet header (Figure 5-4).

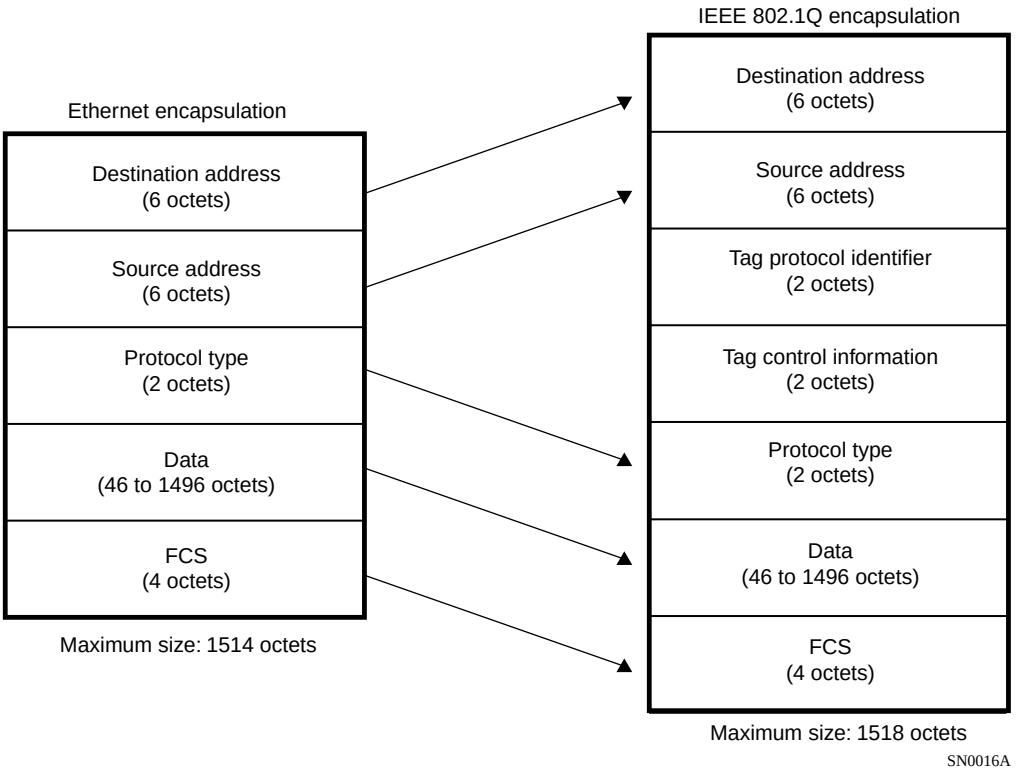

Figure 5-4. IEEE 802.1Q Tagging

The IEEE has not yet standardized values for the *tag protocol identifier* (TPID) field, leaving vendors to provide their own proprietary values. The Accelar family of routing switches, for example, writes a value of 8100 (hexadecimal) to this field.

The *tag control information* (TCI) field contains a unique value that identifies the VLAN on which the frame originated. This value is assigned during the configuration of the layer 2 device.

The addition of the four bytes required for the TPID and TCI fields raises the possibility of generating frames up to 1518 bytes in length, four bytes larger than the maximum packet size specified by Ethernet. Consequently, for frames on which 802.1Q tagging is enabled, BayRS accepts such outsized frames.

Router Processing of Tagged Frames

802.1Q tagging is supported only on 100BASE-T interfaces that connect the Nortel Networks router to an 802.1Q-compliant switch or routing switch. With 802.1Q tagging enabled, the physical connection between the router and the adjacent device supports multiple virtual connections.

The number of connections is equal to the number of virtual connections plus a default physical connection that provides transit services for other non-VLAN traffic that may be received from or forwarded to the adjacent device.

Upon receipt of a frame across a virtual connection, a circuit manager strips the four bytes of 802.1Q header information and directs a now standard Ethernet frame to a connection-specific routing process. The routing process consults its forwarding table and, in turn, directs the frame to a circuit manager handling the next-hop connection. If that connection is a non-tagged, non-virtual connection, processing is completed as for any other standard Ethernet frame.

However, if the next-hop connection is a tagged, virtual connection, the circuit manager inserts the four bytes of 802.1Q header information that identify that VLAN into the standard Ethernet header. After performing the 802.1Q encapsulation, the circuit manager forwards the frame across the virtual connection toward the destination VLAN.

Implementation Considerations

Before you configure 802.1Q tagging on a router, note the following considerations:

- 802.1Q tagging is supported only on 100BASE-T interfaces; it is not supported on other LAN interfaces.
- 802.1Q tagging cannot be used to extend a VLAN across multiple devices.
- The VLAN type (port-based, protocol-based, address-based, and so on) is ignored by the router.

Adding a Tagged Circuit to an Unconfigured 100BASE-T Interface

The following procedure describes how to add an 802.1Q tagged circuit to a previously unconfigured 100BASE-T interface. The procedure assumes that you are configuring the 802.1Q tagged circuit for IP routing. To enable other routing protocols on an 802.1Q tagged circuit, see the appropriate guide for that protocol.

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on a 100BASE-T connector.	The Add Circuit window opens.
2. Click on **OK**.	The Select Protocols window opens.
3. Choose **VLAN**, then click on **OK**.	The Edit VLAN Interface Parameters window opens.
4. Click on **Add**.	The TAG1Q Parameters window opens.
5. Set the following parameters: • **VLAN Name** • **Global VLAN Id** Click on **Help** or see the parameter descriptions beginning on page A-29.	
6. Click on **OK**.	The Edit VLAN Interface Parameters window opens. Note that 802.1Q tagged circuits are displayed with a V*n* extension.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
7. Select the 802.1Q tagged circuit that you are adding. Set the **Protocol Type (hex)** parameter. Retain the default value for connection to Nortel Networks 802.1Q-enabled devices.	
8. Click on **Apply** and **Done**.	You return to the Configuration Manager window.
To add IP routing to the 802.1Q tagged circuit:	
9. Choose **Circuits**.	
10. Choose **Edit Circuits**.	The Circuit List window opens.
11. Select the 802.1Q tagged circuit. Note that 802.1Q tagged circuits are displayed with a V*n* extension.	
12. Click on **Edit**.	The Circuit Definition window opens.
13. Choose **Protocols**.	
14. Choose **Add/Delete**.	The Select Protocols window opens.
15. Select **IP** and click on **OK**.	The IP Configuration window opens.
16. Enter an IP address and subnet mask and click on **OK**.	The Circuit Definition window opens.
17. Choose **File**.	
18. Choose **Exit**.	The Circuit List window opens.
19. Click on **Done**.	You return to the Configuration Manager window.

Adding a Tagged Circuit to an Existing 100BASE-T Interface

To add an 802.1Q tagged circuit to an existing 100BASE-T interface, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on a 100BASE-T connector.	The Edit Connector window opens.
2. Click on **Edit Circuit**.	The Circuit Definition window opens.
3. Choose **Protocols**.	The Protocols menu opens.
4. Choose **Add/Delete**.	The Select Protocols window opens.
5. Choose **VLAN**, then click on **OK**.	The Edit VLAN Interface Parameters window opens.
6. Click on **Add**.	The TAG1Q Parameters window opens.
7. Set the following parameters: • **VLAN Name** • **Global VLAN Id** Click on **Help** or see the parameter descriptions beginning on page A-29.	
8. Click on **OK**.	The Edit VLAN Interface Parameters window opens. Note that 802.1Q tagged circuits are displayed with a V*n* extension.
9. Select the 802.1Q tagged circuit that you are adding. Set the **Protocol Type (hex)** parameter. Retain the default value for connection to Nortel Networks 802.1Q-enabled devices.	
10. Click on **Apply** and **Done**.	You return to the Configuration Manager window.
To add IP routing to the 802.1Q tagged circuit:	
11. Choose **Circuits**.	
12. Choose **Edit Circuits**.	The Circuit List window opens.
13. Select the 802.1Q tagged circuit. Note that 802.1Q tagged circuits are displayed with a V*n* extension.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
14. Click on **Edit**.	The Circuit Definition window opens.
15. Choose **Protocols**.	
16. Choose **Add/Delete**.	The Select Protocols window opens.
17. Select **IP** and click on **OK**.	The IP Configuration window opens.
18. Enter an IP address and subnet mask and click on **OK**.	The Circuit Definition window opens.
19. Choose **File**.	
20. Choose **Exit**.	The Circuit List window opens.
21. Click on **Done**.	You return to the Configuration Manager window.

Editing a Tagged Circuit

To edit an 802.1Q tagged circuit, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Protocols**.	The Protocols menu opens.
2. Choose **VLAN**.	The VLAN menu opens.
3. Choose **Interfaces**.	The Edit VLAN Interface Parameters window opens.
4. Select the 802.1Q tagged circuit that you want to edit.	Site Manager displays the current parameter values for the circuit.
5. Edit the following parameters as required: • **VLAN Name** • **Global VLAN Id** • **Protocol Type (hex)** Click on **Help** or see the parameter descriptions beginning on page A-29.	
6. Click on **Apply** and **Done**.	You return to the Configuration Manager window.

Disabling a Tagged Circuit

To disable an 802.1Q tagged circuit, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Protocols**.	The Protocols menu opens.
2. Choose **VLAN**.	The VLAN menu opens.
3. Choose **Interfaces**.	The Edit VLAN Interface Parameters window opens.
4. Select the 802.1Q tagged circuit that you want to disable.	Site Manager displays the current parameter values for the circuit.
5. Set the **Enable/Disable** parameter to **Disable**.	
6. Click on **Apply** and **Done**.	You return to the Configuration Manager window.

Deleting a Tagged Circuit

To delete an 802.1Q tagged circuit, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Protocols**.	The Protocols menu opens.
2. Choose **VLAN**.	The VLAN menu opens.
3. Choose **Interfaces**.	The Edit VLAN Interface Parameters window opens.
4. Select the 802.1Q tagged circuit that you want to delete.	Site Manager displays the current parameter values for the circuit.
5. Click on **Delete** and **Done**.	You return to the Configuration Manager window.

Appendix A
Site Manager Parameters

This appendix contains the Site Manager parameter descriptions for Ethernet, FDDI, and token ring line services and for 802.1Q tagging. You can display the same information using Site Manager online Help.

This appendix contains the following information:

Topic	Page
CSMA/CD Line Parameters	A-2
100 Mb/s CSMA/CD Line Parameters	A-6
10/100 Mb/s and 1000 Mb/s Ethernet Parameters	A-10
FDDI Line Parameters	A-17
Token Ring Line Parameters	A-25
802.1Q Parameters	A-28

For each parameter, this appendix provides the following information:

- Parameter name
- Configuration Manager menu path
- Default setting
- Valid parameter options
- Parameter function
- Instructions for setting the parameter
- Management information base (MIB) object ID

The Technician Interface allows you to modify parameters by issuing **set** and **commit** commands with the MIB object ID. This process is equivalent to modifying parameters using Site Manager. For more information about using the Technician Interface to access the MIB, see *Using Technician Interface Software*.

Caution: The Technician Interface does not verify the validity of your parameter values. Entering an invalid value can corrupt your configuration.

CSMA/CD Line Parameters

The Edit CSMA/CD Parameters window (Figure A-1) allows you to enable BofL and hardware filters for the specified circuit. This window appears for 10BASE-T modules only.

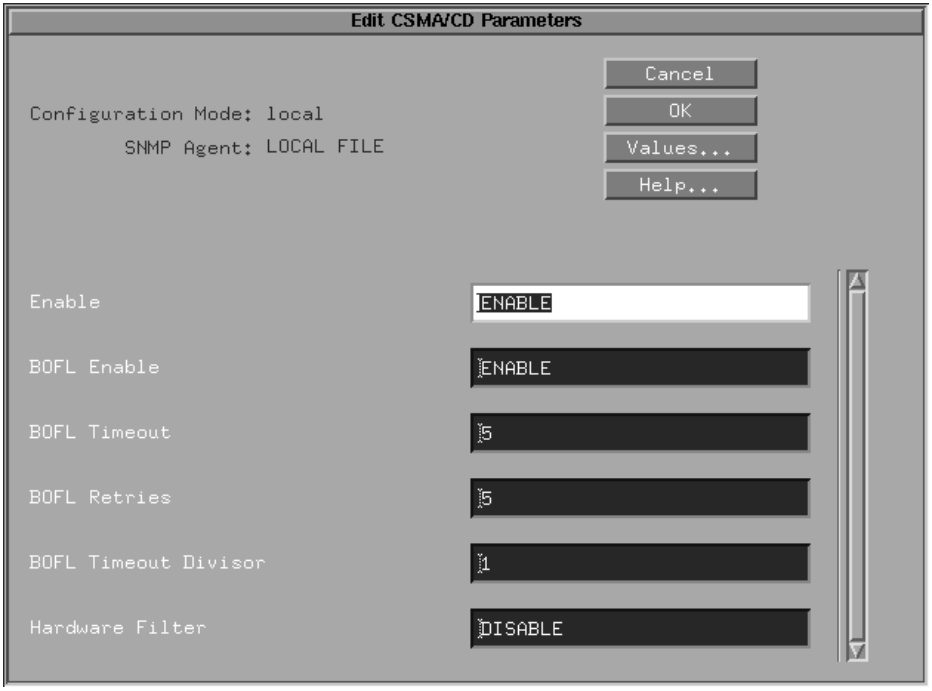

Figure A-1. Edit CSMA/CD Parameters Window

Parameter: **Enable**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**
Default: Enable
Options: Enable | Disable
Function: Enables or disables this Ethernet line.
Instructions: Select Enable or Disable.
MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.2

Parameter: **BofL Enable**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**
Default: Enable
Options: Enable | Disable
Function: When set to Enable, the router sends BofL polling messages from this system to all systems on the local network.
Instructions: Set to Enable or Disable. We recommend that you enable BofL.
MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.7

Parameter: **BofL Timeout**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**
Default: 5 (4 if router redundancy is enabled)
Options: 1 to 60 seconds
Function: Specifies the time between transmissions of Breath of Life messages from this Ethernet interface. Timeout will occur if five periods elapse without a successful BofL message transmission. When timeout occurs, the router disables and reenables the Ethernet interface.

This parameter is valid only if you set BofL Enable to Enable.

Instructions: Accept the default BofL timeout of 5 seconds, or specify a new value up to 60 seconds.
MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.8

Parameter: BofL Retries

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: 5 (4 if router redundancy is enabled)

Options: 1 to 60 retries

Function: Specifies the number of Breath of Life messages this interface can retransmit before the router declares the circuit down.

Instructions: Either accept the default of five BofL retries or specify a value from 1 to 60 retries. Use this parameter in conjunction with the BofL Timeout and BofL Timeout Divisor parameters to decrease or increase the time it takes the router to declare an interface down.

MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.59

Parameter: BofL Timeout Divisor

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: 1 (10 if router redundancy is enabled)

Options: 1 to 100

Function: The time between BofL transmissions is the value of the BofL Timeout parameter divided by the value of the BofL Timeout Divisor parameter. When BofL Timeout Divisor is set to the default value of 1, it has no effect on the value of BofL Timeout. Setting BofL Timeout Divisor to a value greater than 1 reduces the BofL timeout period.

Instructions: Accept the default or enter a number from 1 to 100.

MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.60

Parameter:	**Hardware Filter**
Path:	Configuration Manager > **XCVR** Connector > **Edit Line**
Default:	Disable (the default changes to Enable when, while adding the circuit, you reply OK to the prompt: `Do you want to enable Hardware Filters on this circuit?`)
Options:	Enable | Disable
Function:	Enables filtering hardware in the link or net module to drop local frames at the interface instead of copying them into system memory. Enabling hardware filters improves bridging software performance because router resources are not used to receive and reject local frames.
Instructions:	Set to Enable only if you enabled the bridge software and the link or net module has hardware filters.
MIB Object ID:	1.3.6.1.4.1.18.3.4.1.1.29

100 Mb/s CSMA/CD Line Parameters

The Edit 100 Mb/s CSMA/CD Parameters window (Figure A-2) allows you to enable BofL and specify line speed for the dual 100BASE-T module.

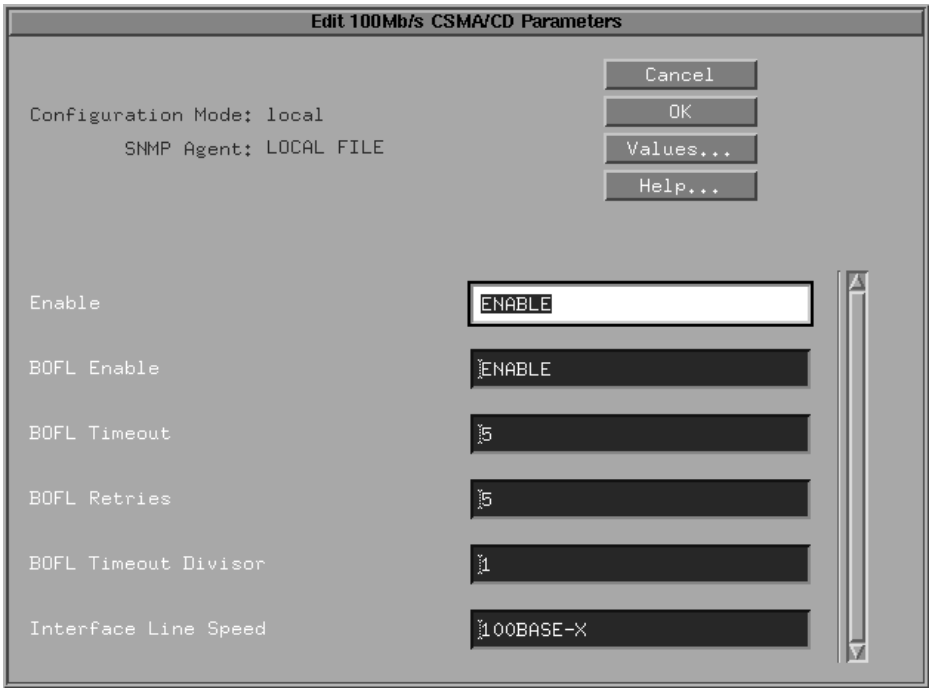

Figure A-2. Edit 100Mb/s CSMA/CD Parameters Window

Parameter: Enable

Path: Configuration Manager > **XCVR** Connector > **Edit Line**
Default: Enable
Options: Enable | Disable
Function: Enables or disables this Ethernet line.
Instructions: Select Enable or Disable.
MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.2

Parameter: **BofL Enable**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: Enable

Options: Enable | Disable

Function: When set to Enable, the router sends BofL polling messages from this system to all systems on the local network.

Instructions: Set to Enable or Disable. We recommend that you enable BofL.

MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.7

Parameter: **BofL Timeout**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: 5 (4 if router redundancy is enabled)

Options: 1 to 60 seconds

Function: Specifies the time between transmissions of BofL messages from this Ethernet interface. Timeout will occur if five periods elapse without a successful BofL message transmission. When timeout occurs, the router disables and reenables the Ethernet interface.

This parameter is valid only if you set the BofL Enable parameter to Enable.

Instructions: Accept the default BofL timeout of 5 seconds, or specify a new value up to 60 seconds.

MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.8

Parameter: **BofL Retries**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: 5 (4 if router redundancy is enabled)

Options: 1 to 60 retries

Function: Specifies the number of BofL messages this interface can retransmit before the router declares the circuit down.

Instructions: Either accept the default of 5 BofL retries or specify a value from 1 to 60 retries. Use this parameter in conjunction with the BofL Timeout and BofL Timeout Divisor parameters to decrease or increase the time it takes the router to declare an interface down.

MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.59

Parameter: **BofL Timeout Divisor**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: 1 (10 if router redundancy is enabled)

Options: 1 to 100

Function: The time between BofL transmissions is the value of the BofL Timeout parameter divided by the value of the BofL Timeout Divisor parameter. When BofL Timeout Divisor is set to the default value of 1, it has no effect on the value of BofL Timeout. Setting BofL Timeout Divisor to a value greater than 1 reduces the BofL timeout period.

Instructions: Accept the default or enter a number from 1 to 100.

MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.60

Parameter: **Interface Line Speed**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: 100Base-X

Options: Auto Negotiation │ 100Base-X │ 100Base-X (Full Duplex) │ 100Base-X (FD w/flow control)

Function: Specifies the configured line speed and duplex setting for the selected interface, or enables automatic line negotiation.

Instructions: To enable automatic line negotiation, select Auto Negotiation.

To configure a specific line speed, select one of the following:

- 100Base-X
- 100Base-X (Full Duplex)
- 100Base-X (FD w/flow control)

Selecting a specific line speed disables Auto Negotiation.

MIB Object ID: 1.3.6.1.4.1.18.3.4.16.1.1.4

Parameter: **Line Advertising Capabilities**

Path: Configuration Manager > **XCVR** Connector > **Edit Line** > Edit CSMA/CD Parameters > Interface Line Speed parameter = Auto Negotiation > **OK** > **Configure Line Capabilities**

Default: 0000

Options: 0000 | 1000 | 0100 | 0010 | 0001 | 1111

Function: Specifies the line configurations available to remote nodes that have automatic line negotiation capability.

Instructions: Select the code for the desired line advertising:

- No advertising = 0000
- 10Base-T = 1000
- 10Base-T, full duplex only = 0100
- 100Base-TX = 0010
- 100Base-TX, full duplex only = 0001
- All advertising = 1111

MIB Object ID: 1.3.6.1.4.1.18.3.4.16.1.1.9

10/100 Mb/s and 1000 Mb/s Ethernet Parameters

The Edit Ethernet Parameters windows (Figure A-3, Figure A-4, and Figure A-5) allow you to enable BofL, specify line speed, and enable flow control for Ethernet lines. Figure A-3 is for the Quad 100Base-TX module. Figure A-4 is for the Quad 100Base-FX module. Figure A-5 is for the Gigabit Ethernet-SX and Gigabit Ethernet-LX modules.

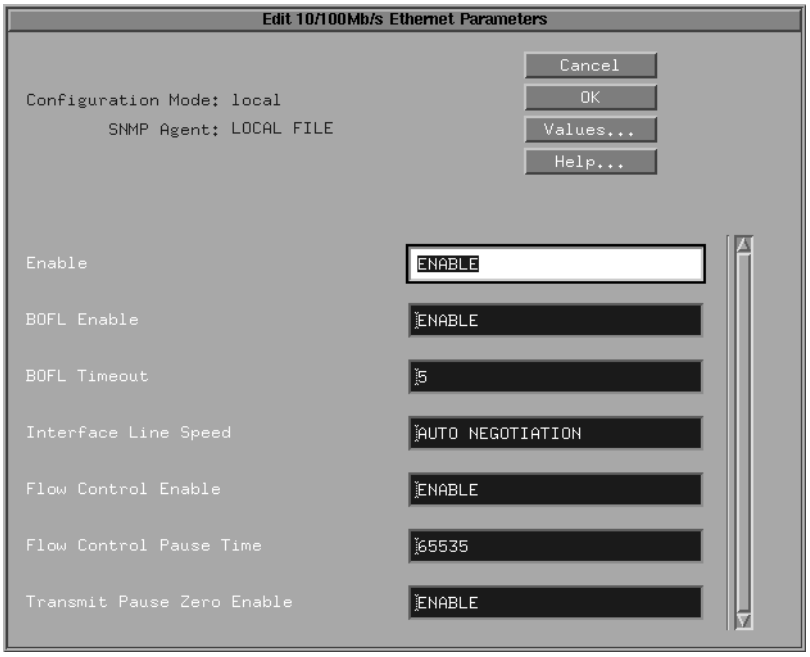

Figure A-3. Edit 10/100Mb/s Ethernet Parameters Window (for the 100Base-TX Module)

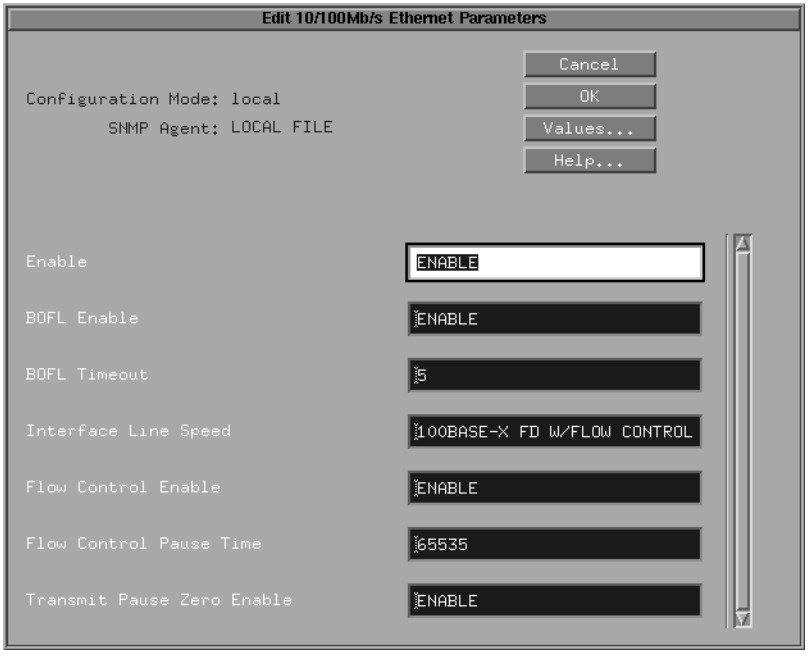

Figure A-4. Edit 10/100Mb/s Ethernet Parameters Window (for the 100Base-FX Module)

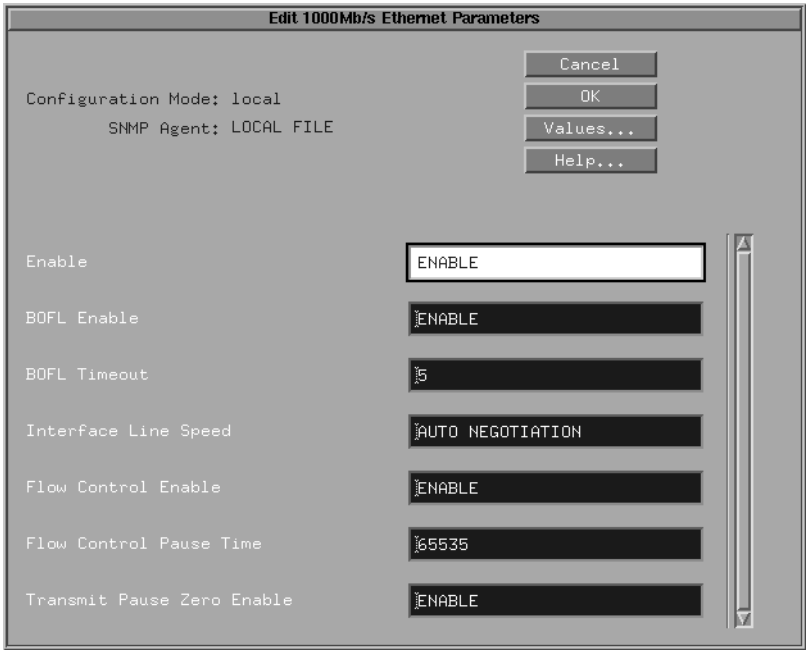

Figure A-5. Edit 1000Mb/s Ethernet Parameters Window

Parameter: Enable

Path: Configuration Manager > **XCVR** Connector > **Edit Line**
Default: Enable
Options: Enable | Disable
Function: Enables or disables this Ethernet line.
Instructions: Select Enable or Disable.
MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.2

Parameter: **BofL Enable**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: Enable

Options: Enable | Disable

Function: When this parameter is set to Enable, the router sends BofL polling messages from this system to all systems on the local network.

Instructions: Set to Enable or Disable. We recommend that you enable BofL.

MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.7

Parameter: **BofL Timeout**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: 5 (4 if router redundancy is enabled)

Options: 1 to 60 seconds

Function: Specifies the time between transmissions of Breath of Life messages from this Ethernet interface. Timeout will occur if five periods elapse without a successful BofL message transmission. When timeout occurs, the router disables and reenables the Ethernet interface.

This parameter is valid only if you set BofL Enable to Enable.

Instructions: Accept the default BofL timeout of 5 seconds, or specify a new value up to 60 seconds.

MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.8

Parameter: **Interface Line Speed**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: Auto Negotiation for 100Base-TX and Gigabit Ethernet modules; 100Base-X FD w/Flow Control for 100Base-FX module

Options: For 100Base-TX, the options are Auto Negotiation │ 10Base-T │ 10Base-T FD (Full Duplex) │ 10Base-T FD w/Flow Control │ 100Base-X │ 100Base-X FD (Full Duplex │ 100Base-X FD w/Flow Control

For 100Base-FX, the options are 100Base-X FD (Full Duplex) │ 100Base-X FD w/Flow Control

For Gigabit Ethernet, the options are Auto Negotiation │ 1000Base-X FD (Full Duplex | 1000Base-X FD w/Flow control

Function: Specifies the configured line speed and duplex setting for the selected interface, or enables automatic line negotiation.

Instructions: For 100Base-TX and Gigabit Ethernet modules, choose Auto Negotiation to enable automatic line negotiation. Selecting a specific line speed disables Auto Negotiation.

For 100Base-FX modules, either accept the default, 100Base-X FD w/Flow Control, or choose 100Base-X FD (Full Duplex).

MIB Object ID: 1.3.6.1.4.1.18.3.4.16.1.1.4

Parameter: **Flow Control Enable**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: Enable

Options: Enable │ Disable

Function: Enables or disables flow control.

Instructions: Accept the default, Enable, or select Disable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.66

Parameter: **Flow Control Pause Time**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: 65535

Options: 32 to 65535 pause times

Function: Specifies the flow control pause time. The pause time is used to calculate the total time a transmitter pauses. For example, when a transmitter receives a pause frame, it pauses for *pause_time* * 512 bit times. (The value 512 bit times converts to 51.2 ms for 10 Mb/s, 5.12 ms for 100 Mb/s, and 512 ns for Gigabit.) Therefore, if the pause time is 65535 and the line speed is 100 Mb/s, then the transmitter pauses for 335.54 ms (65535 * 5.12 ms).

Instructions: Accept the default, 65535, or specify a value from 32 to 65535.

MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.67

Parameter: **Transmit Pause Zero Enable**

Path: Configuration Manager > **XCVR** Connector > **Edit Line**

Default: Enable

Options: Enable | Disable

Function: Enables or disables the ability of a congested receiver to send a pause frame with a pause time of 0 when it is no longer congested. When the remote transmitter receives a pause frame with a 0 pause time, it resumes sending packets.

Instructions: Accept the default, Enable, if you want a congested receiver to send a pause frame with a pause time of 0 when it is no longer congested. Choose Disable if you do not want a congested receiver to send a pause frame with a 0 pause time.

MIB Object ID: 1.3.6.1.4.1.18.3.4.1.1.68

Parameter: Line Advertising Capabilities

Path: Configuration Manager > **XCVR** Connector (Gigabit Ethernet-SX and -LX and Quad 100Base-TX) > **Edit Line** > Edit Ethernet Parameters > Interface Line Speed parameter = Auto Negotiation > **OK** > **Configure Line Capabilities**

Default: 11111 for Quad 100Base-TX; 000011 for Gigabit Ethernet-SX and -LX

Options: 11111 | 10000 | 01000 | 00100 | 00010 | 00001 | 00000 for Quad 100Base-TX; 000011 | 000010 | 000001 for Gigabit Ethernet-SX and -LX

Function: Specifies the line configurations available to remote nodes that have automatic line negotiation capability.

Instructions: Select the code for the desired line advertising. For Quad 100Base-TX, select:

- No advertising = 00000
- 10Base-T = 10000
- 10Base-T, full duplex only = 01000
- 100Base-TX = 00100
- 100Base-TX, full duplex only = 00010
- Pause = 00001
- All advertising = 11111

For Gigabit Ethernet-SX and -LX, select:

- No advertising = 000000
- Pause = 000010
- 1000 Base-X Full Duplex = 000001
- All advertising = 000011

Note: If flow control is enabled, then Pause must be enabled.

MIB Object ID: 1.3.6.1.4.1.18.3.4.16.1.1.9

FDDI Line Parameters

The FDDI Parameters window (Figure A-6) allows you to enable the FDDI circuit for the selected connector, enable BofL, and enable hardware filtering.

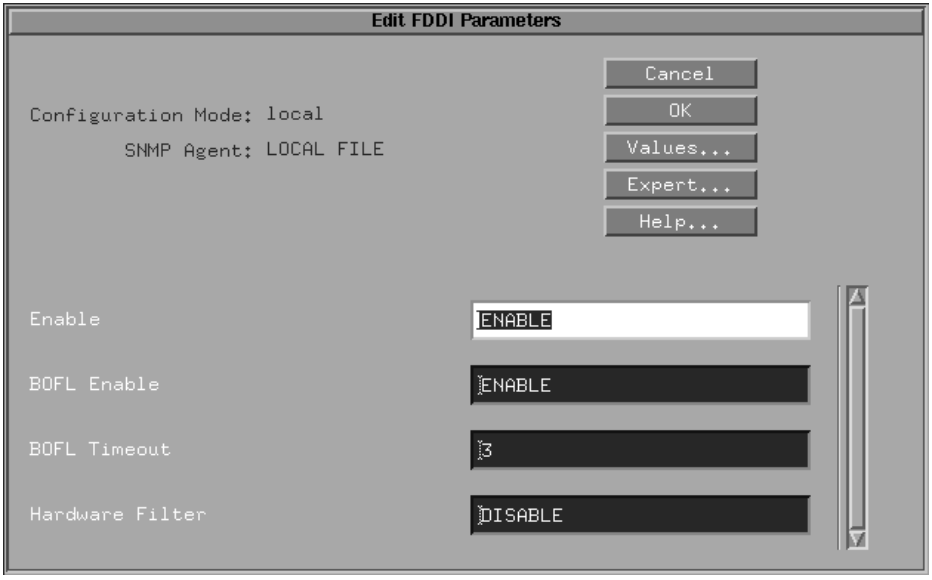

Figure A-6. Edit FDDI Parameters Window

Parameter: Enable

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters

Default: Enable

Options: Enable | Disable

Function: Enables or disables the FDDI circuit for the selected connector.

Instructions: Set to Enable or Disable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.4.1.2

Parameter: **BofL Enable**

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters

Default: Enable

Options: Enable | Disable

Function: Enables or disables BofL polling.

When you set both this parameter and the LLC Data Enable parameter to Enable, the router disables the LLC interface after the time you specify using the BofL Timeout parameter if the link becomes unavailable.

When you set this parameter to Disable, the router disables the LLC interface immediately after the link becomes unavailable.

Instructions: Set to Enable or Disable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.4.1.7

Parameter: **BofL Timeout**

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters

Default: 3

Options: 1 to 60 seconds

Function: When BofL is enabled and the link becomes unavailable, this parameter specifies the time Site Manager waits before disabling the LLC interface.

Instructions: Accept the default value, 3 seconds, or specify a new value. Be sure to set the BofL Enable parameter to Enable.

MIB Object ID: 1.3.6.1.4.1.18.3.4.4.1.8

Parameter: Hardware Filter

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters

Default: Disable (the default changes to Enable when, while adding the circuit, you reply OK to the prompt:
`Do you want to enable Hardware Filters on this circuit?`)

Options: Enable │ Disable

Function: When you set this parameter to Enable, the link module filtering hardware, if present, does not allow the router to copy local frames into memory. In essence, the filtering hardware drops local frames at the interface. Hardware filtering improves performance because the bridging software no longer uses resources to receive and reject those frames.

Instructions: Set to Enable only if the link module has hardware filters and you enabled bridge software.

MIB Object ID: 1.3.6.1.4.1.18.3.4.4.1.37

Parameter: **Connection Policy**

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **SMT Attributes** > FDDI SMT Attributes

Default: 0xFF65

Options: 0x0 to 0xFFFF

Function: Specifies the connection policies this line requests at the FDDI station.

The policy descriptor takes the form “rejectX-Y” where X denotes the physical connection (PC) type of the local port, and Y denotes the PC type of the neighbor port. X and Y can have the following values:

- A -- Indicates that the port is a dual-attachment station or concentrator that attaches to the primary IN and the secondary OUT when attaching to the dual FDDI ring
- B -- Indicates that the port is a dual-attachment station or concentrator that attaches to the secondary IN and the primary OUT when attaching to the dual FDDI ring
- S -- Indicates a port in a single-attachment station or concentrator
- M -- Indicates a port in a concentrator that serves as a master to a connected station or concentrator

Instructions: Specify the status word value that represents the connection policies you want this line to reject. Start with a value of zero for the status word (all bits set to 0). For each connection policy you want the node to reject, add to the status word value the number 2 raised to a power specified in Table 3-2 on page 3-10. This is equivalent to setting a bit to 1 for each policy that you want the node to reject.

MIB Object ID: 1.3.6.1.4.1.18.3.4.4.1.30

Parameter: **T_Notify Timeout**

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **SMT Attributes** > FDDI SMT Attributes

Default: 22

Options: 2 to 30 seconds

Function: Specifies the interval between successful iterations of the Neighbor Notification Protocol.

Instructions: Accept the default value of 22 seconds or specify a new value from 2 to 30 seconds.

MIB Object ID: 1.3.6.1.4.1.18.3.4.4.1.31

Parameter: User Data

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **SMT Attributes** > FDDI SMT Attributes

Default: None

Options: Any string up to 32 alphanumeric characters

Function: Allows you to enter additional information about the router. This information is attached to the status information frames (SIFs).

Instructions: Enter up to 32 alphanumeric characters.

MIB Object ID: 1.3.6.1.4.1.18.3.4.15.1.3.1.8

Parameter: Status Report Protocol

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **SMT Attributes** > FDDI SMT Attributes

Default: Enable

Options: Enable | Disable

Function: Specifies whether the node will generate Status Report Frames (SRFs) for its implemented events (for example, high bit errors, topology changes, trace status events, MAC frame error condition, port LER condition, and MAC duplicate address condition).

Instructions: Accept the default, Enable, if you want the node to generate SRFs; specify Disable if you do not want the node to generate SRFs. We recommend using Enable to ensure that your FDDI network is ANSI-compliant.

MIB Object ID: 1.3.6.1.4.1.18.3.4.15.1.3.1.14

Parameter: Trace Max Expiration (ms)

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **SMT Attributes** > FDDI SMT Attributes

Default: 7000

Options: 6001 to 256000 milliseconds

Function: Specifies the maximum propagation time for a trace on an FDDI topology.

Instructions: Enter a value from 6001 to 256000. We recommend accepting the default value of 7000 milliseconds (7 seconds).

MIB Object ID: 1.3.6.1.4.1.18.3.4.15.1.3.1.15

Parameter: Duplicate Address Protocol

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **SMT Attributes** > FDDI SMT Attributes

Default: Enable

Options: Enable | Disable

Function: Implements an optional ANSI duplicate address test involving periodic transmission of Network Service Address Network Interface Function (NSA NIF) frames to the source.

Instructions: Accept the default, Enable, if you want to test for duplicate addresses. Specify Disable if you do not want to test for duplicate addresses.

MIB Object ID: 1.3.6.1.4.1.18.3.4.15.1.3.1.18

Parameter: LLC Data Enable

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **MAC Attributes** > FDDI MAC Attributes

Default: Enable

Options: Enable | Disable

Function: Specifies whether the MAC is available to transmit and receive Logical Link Control (LLC) protocol data units (PDUs). If you accept Enable, the interface to the MAC entity is available to exchange PDUs between the MAC and the local LLC entity when the ring becomes operational. Setting this attribute does not affect transferring and receiving MAC or SMT frame types.

Instructions: Accept the default, Enable, if you want the MAC available for transmitting and receiving LLC PDUs; specify Disable if you do not want the MAC available for transmitting and receiving LLC PDUs.

MIB Object ID: 1.3.6.1.4.1.18.3.4.15.2.3.1.17

Parameter: **Tvx Lower Bound (ms)**

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **Path Attributes** > FDDI Path Attributes

Default: 2.5

Options: The value (in milliseconds) must be greater than zero and less than the value of Requested TTRT. If the value of Requested TTRT is greater than 5.2 ms, set this parameter to a value less than or equal to 5.2 ms. For example, if the value of Requested TTRT is 165 ms, the value for Tvx Lower Bound must be less than or equal to 5.2 ms.

Function: Specifies the minimum time value of the Valid Transmission Timer (TVX).

Instructions: Accept the default value of 2.5 milliseconds or specify a new value less than or equal to 5.2 milliseconds and less than the value of Requested TTRT.

MIB Object ID: 1.3.6.1.4.1.18.3.4.15.3.3.1.5

Parameter: **T_Max Lower Bound (ms)**

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **Path Attributes** > FDDI Path Attributes

Default: 165

Options: 10 to 1336.9344 ms

Function: Allows you to specify the maximum time value of TTRT. The value (in milliseconds) must be greater than or equal to 10 ms, greater than or equal to the value of the Requested TTRT (ms) parameter, and less than or equal to 1336.9344 ms.

Instructions: Accept the default value of 165 ms, or specify a new value less than or equal to 1336.9344 ms and greater than or equal to the value of the Requested TTRT (ms) parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.4.15.3.3.1.6

Parameter: Requested TTRT (ms)

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **Path Attributes** > FDDI Path Attributes

Default: 165

Options: Variable. This value (in milliseconds) must be greater than the value specified for the TVX Lower Bound (ms) parameter and less than or equal to the value specified for the T_Max Lower Bound (ms) parameter.

Function: Specifies the target token rotation time carried in claim frames issued by the FDDI station.

Instructions: Accept the default of 165 ms or enter a new value in milliseconds.

MIB Object ID: 1.3.6.1.4.1.18.3.4.4.1.32

Parameter: LER Cutoff

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **Port Attributes** > FDDI Port Attributes

Default: 7

Options: 4 to 15

Function: Specifies the link error rate estimate at which a link connection is broken. It ranges from 10^{-4} to 10^{-15} and is reported as the absolute value of the base 10 logarithm.

Instructions: Accept the default value of 7 or specify a new value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.15.4.3.1.17

Parameter: LER Alarm

Path: Configuration Manager > **FDDI** Connector > **Edit Line** > Edit FDDI Parameters > **Expert** > **Port Attributes** > FDDI Port Attributes

Default: 8

Options: 4 to 15

Function: Specifies the link error rate estimate at which a link connection generates an alarm. It ranges from 10^{-4} to 10^{-15} and is reported as the absolute value of the base 10 logarithm of the estimate.

Instructions: Accept the default value of 8 or specify a new value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.15.4.3.1.18

Token Ring Line Parameters

The Edit Token Ring Parameters window (Figure A-7) allows you to enable the token ring circuit, determine the source of the MAC address, and specify the speed of the token ring media.

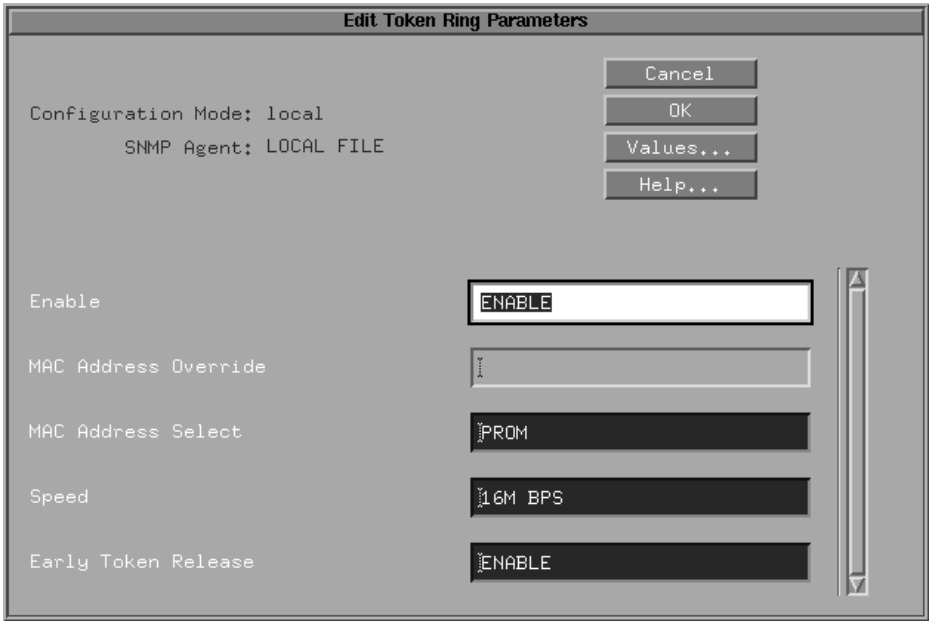

Figure A-7. Edit Token Ring Parameters Window

Parameter: Enable

Path: Configuration Manager > **TOKEN** Connector > **Edit Line** > Edit Token Ring Parameters

Default: Enable

Options: Enable | Disable

Function: Enables or disables the token ring circuit.

Instructions: Set to Disable if you want to disable the token ring circuit.

MIB Object ID: 1.3.6.1.4.1.18.3.4.2.1.2

Parameter: **MAC Address Override**

Path: Configuration Manager > **TOKEN** Connector > **Edit Line** > Edit Token Ring Parameters

Default: None

Options: Any valid, 48-bit MAC-level address

Function: Assigns a user-specified MAC address.

Instructions: If you want the router to generate the MAC address for this token ring interface, ignore this parameter.

If you want to specify a MAC address (for example, to avoid host number conflicts on a directly connected IPX or XNS network), enter the 48-bit MAC address in MSB format; that is, enter 0x followed by 12 hexadecimal digits.

If you enter a MAC address with this parameter, you must set the MAC Address Select parameter to CNFG.

MIB Object ID: 1.3.6.1.4.1.18.3.4.2.1.9

Parameter: **MAC Address Select**

Path: Configuration Manager > **TOKEN** Connector > **Edit Line** > Edit Token Ring Parameters

Default: PROM

Options: BOXWIDE | PROM | CNFG

Function: Determines the source of the MAC address.

Instructions: Enter BOXWIDE if you want the token ring interface to use a MAC address that the software generates from the router's serial number.

Enter PROM if you want the token ring interface to use a MAC address from programmable read-only memory on the token ring link module.

Enter CNFG if you explicitly assigned a MAC address with the MAC Address Override parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.4.2.1.10

Parameter: Speed

Path: Configuration Manager > **TOKEN** Connector > **Edit Line** > Edit Token Ring Parameters

Default: 16

Options: 16 Mb/s | 4 Mb/s

Function: Specifies the speed of the token ring media. If you select 16 Mb/s, the router enables the Early Token Release protocol, which is used extensively on 16 Mb/s media. In the unlikely event that you want to disable early token release over 16 Mb/s token ring media, you can do so with the Early Token Release parameter.

Instructions: Enter the ring speed.

MIB Object ID: 1.3.6.1.4.1.18.3.4.2.1.11

Parameter: Early Token Release

Path: Configuration Manager > **TOKEN** Connector > **Edit Line** > Edit Token Ring Parameters

Default: Enable

Options: Enable | Disable

Function: Indicates whether the token can return to the ring before the recipient copies all data. This parameter is valid only when you set the Speed parameter to 16 Mb/s.

Instructions: Accept the current value.

MIB Object ID: 1.3.6.1.4.1.18.3.4.2.1.12

802.1Q Parameters

The Edit VLAN Interface Parameters window (Figure A-8) allows you to enable the 802.1Q tagged circuit, enter a name for the VLAN, and provide a unique identifier for the VLAN.

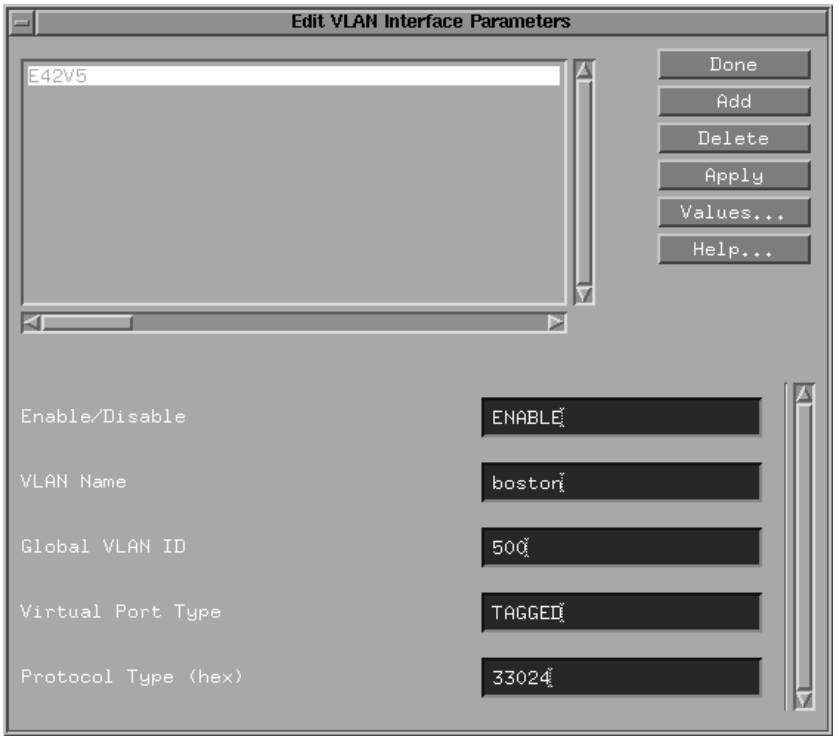

Figure A-8. Edit VLAN Interface Parameters Window

Parameter: Enable/Disable

Path: Configuration Manager > Protocols > VLAN > Interfaces
Default: Enable
Options: Enable | Disable
Function: Enables or disables the 802.1Q tagged circuit.
Instructions: Set to Disable to disable a previously configured 802.1 tagged circuit. Set to Enable to enable a disabled 802.1Q tagged circuit.
MIB Object ID: 1.3.6.1.4.1.18.3.5.1.12.6.1.1.1.2

Parameter: VLAN Name

Path: Configuration Manager > Protocols > VLAN > Interfaces
Default: None
Options: Any character string
Function: Specifies a name to associate with the VLAN. BayRS does not use this string.
Instructions: Enter a name for the VLAN.
MIB Object ID: 1.3.6.1.4.1.18.3.5.1.12.6.1.1.1.3

Parameter: Global VLAN Id

Path: Configuration Manager > Protocols > VLAN > Interfaces
Default: None
Options: Any integer value from 1 to 4095
Function: Provides a unique identifier for the VLAN within the layer 2/layer 3 topology.
Instructions: Enter the unique VLAN numeric identifier that was assigned to the VLAN when it was initially configured on the adjacent layer 2 device. This value must match the one assigned during the initial VLAN configuration.
MIB Object ID: 1.3.6.1.4.1.18.3.5.1.12.6.1.1.1.5

Parameter:	**Virtual Port Type**
Path:	Configuration Manager > Protocols > VLAN > Interfaces
Default:	Tagged
Options:	Tagged
Function:	Reserved for future use.
Instructions:	Leave this parameter set to tagged.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.12.6.1.1.1.6

Parameter:	**Protocol Type (hex)**
Path:	Configuration Manager > Protocols > VLAN > Interfaces
Default:	33024 (8100 hexadecimal)
Options:	Any integer value
Function:	Specifies the contents of the TPID field in 802.1Q encapsulated frames originated by this VLAN.
Instructions:	Enter (in decimal notation) the TPID value that was assigned to the VLAN when it was initially configured on the adjacent layer 2 device. This value must match the one assigned during the initial VLAN configuration.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.12.6.1.1.1.8

Appendix B
BCC show Commands

This appendix describes how to use the BCC **show** command to obtain Ethernet, FDDI, and token ring statistical data from the management information base (MIB). The type and amount of data displayed depend on the specific settings you want to view. This appendix includes descriptions of the following **show** commands:

Command	Page
show ethernet alerts	B-3
show ethernet auto-neg	B-4
show ethernet detail	B-5
show ethernet errors	B-6
show ethernet flow-control	B-8
show ethernet sample	B-9
show ethernet stats	B-10
show ethernet summary	B-11
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show fddi detail	B-14
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show fddi port	B-18
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show token-ring alerts	B-24

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Command	Page
show token-ring detail	B-25
show token-ring errors	B-26
show token-ring sample	B-28
show token-ring stats	B-29
show token-ring summary	B-30

show ethernet alerts

The **show ethernet alerts** command displays all circuits that are enabled but not up. Use this display to identify interfaces that are not working.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the Ethernet module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Admin State	Configured state of the Ethernet interface: Up or Down.
HW Address	Line's physical address. The driver assigns this address.
Operational State	State of the line driver: Down, Init (initializing), Not Present (enabled but not yet started), or Up. The Not Present state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Total Time Up/Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s*** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m*** where *dd* is days, *hh* is hours, and *mm* is minutes. For example, the value might appear as `2d10h15m`.

(continued)

Errors	Total number of errors (see **show ethernet errors**).
MTU	Maximum transmission unit (MTU) size for frames on this line.
Speed	Circuit's configured line speed: 10 Mb/s or 100 Mb/s.

show ethernet auto-neg

The **show ethernet auto-neg** command displays the line speed characteristics of Ethernet circuits that are configured with automatic line negotiation. Some Ethernet modules can run at either 10 Mb/s or 100 Mb/s using a hardware process to detect the speed to use. Use this command to identify the status of autonegotiation.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the Ethernet module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
State	State of the line driver: Disabled, Down, Init (initializing), Not Present (enabled but not yet started), or Up.
Auto-Negotiation State	Disabled, Configuring, Complete, Parallel Detect Failure.
Remote Signaling	Detected or Not Detected.
Line Capability Being Used	10 or 100 Mb/s.

show ethernet detail

The **show ethernet detail** command displays all MIB data about all Ethernet circuits or a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

show ethernet errors

The **show ethernet errors** command displays receive, transmit, and system errors for all Ethernet circuits or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Receive Errors	
Slot/Conn	Slot location of the Ethernet module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Checksum Errors	Number of frames received with a CRC error.
Alignment Errors	Number of frames received that did not contain an integral number of octets. Normally a frame alignment error also causes a checksum error on the frame.
Overflow Errors	Number of overflow errors received on this line in which the device FIFO buffer overflowed before obtaining the next DMA cycle.
Frames Too Long	Number of frames received that exceed the MTU size.
Symbol Errors	Number of errors in hardware MLT3 encoding. This indicates a problem and is relevant only for 100 Mb/s lines.
Internal MAC Errors	Number of frames containing fewer than 64 octets (*runt packets*).
Late Collision	Number of transmitter out-of-window collisions while receiving the next packet. This usually indicates wiring or other hardware problems.
Transmit Errors	
Slot/Conn	Slot location of the Ethernet module within the chassis and the connector number.
Frames Too Long	Number of frames transmitted that exceed the MTU size.
Underflow Errors	Number of frames in which the transmitter was unable to obtain an entire packet from memory fast enough to keep up with the interface.

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Internal MAC Errors	Number of excessive deferrals. An excessive deferral indicates that during the previous transmission the deferral time was greater than 2.46 ms and the transmission was aborted.
Deadlock Errors	Number of times the hardware entered a transmitter lockup condition and the software attempted to work around the condition.
Excessive Collisions	Number of times the transmitter failed in 16 attempts to successfully transmit a message due to repeated collisions on the interface.
Late Collisions	Number of collisions that occurred after the timeslot of the channel elapsed.
System Errors	
Slot/Conn	Slot location of the Ethernet module within the chassis and the connector number.
Memory Errors	Number of internal memory errors. If this error persists, replace the Ethernet interface hardware.
Collision Errors	Number of times the driver detects that the external transceiver has not performed the SQE test after frame transmissions. When the SQE test is enabled on the transceiver, the transceiver asserts collision to the Ethernet interface after every transmission to provide an ongoing confidence test of the collision detection circuitry. An increase in this statistic may mean only that you need to enable the SQE test on the transceiver.
Internal Errors	Number of internal buffer errors. If this error persists, replace the Ethernet interface hardware.
Loss of Carrier	Number of loss of carrier errors, in which the transceiver fails to sense the carrier signal on the interface.

show ethernet flow-control

The **show ethernet flow-control** command shows the status of the slots on which flow control is enabled.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot_number>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot and connector number.
Circuit	Circuit number.
Flow Ctrl Enable	Whether flow control is enabled on the slot.
Pause Zero Enable	Whether transmit pause 0 is enabled on the slot.
Pause Time	Pause time specified for the transmitter.
Received FlowCtrl Frames	Number of flow control frames received by the interface.
Transmit FlowCtrl Frames	Number of flow control frames sent by the interface.
Received Unsupported Opcodes	Number of frames received by the interface that do not have a Pause opcode.

show ethernet sample

The **show ethernet sample** command displays data sampled from Ethernet interfaces over a period of 10 seconds. You can change the number of seconds over which you want to sample the data, and you can display sampled data for a specific circuit or slot only.

This command allows for the following command filters (flags) and filter arguments:

-period *<number_of_seconds>*	Displays data sampled during the period (number of seconds) specified.
-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the Ethernet module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Input Rate/<sec.> (bytes/sec)	Number of octets received without error.
Input Rate/<sec.> (Pkts/sec)	Number of frames received without error.
Output Rate/<sec.> (bytes/sec)	Number of octets transmitted without error.
Output Rate/<sec.> (Pkts/sec)	Number of frames transmitted without error.
Input Lack of Resource	Number of `receiver lack of resource` errors.
Output Lack of Resource	Number of frames clipped in the driver's transmit routine due to congestion.

show ethernet stats

The **show ethernet stats** command displays transmit and receive statistical information for all Ethernet circuits or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the Ethernet module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
State	State of the line driver: Down, Init (initializing), Not Present (enabled but not yet started), or Up. The Not Present state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Errors:	
Receive	Number of frames received with errors (see **show ethernet errors** for greater detail).
Transmit	Number of transmit frames with errors (see **show ethernet errors** for greater detail).
Bytes:	
Receive	Number of octets received without error.
Transmit	Number of octets transmitted without error.
Frames:	
Receive	Number of frames received without error.
Transmit	Number of frames transmitted without error.

(continued)

Multicast:

Receive	Number of packets received that are not unicast packets.

show ethernet summary

The **show ethernet summary** command displays the current configuration for all Ethernet circuits or a specific circuit or slot. This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the Ethernet module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Admin State	Configured state of the Ethernet interface: Up or Down.
HW Address	Line's physical address. The driver assigns this address.
Operational State	State of the line driver: Down, Init (initializing), Not Present (enabled but not yet started), or Up. The Not Present state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.

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Total Time Up/Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m** where *dd* is days, *hh* is hours, and *mm* is minutes. For example, the value might appear as `2d10h15m`.
Errors	Total number of errors (see **show ethernet errors** for greater detail).
MTU	MTU size for frames on this line.
Speed	Circuit's configured line speed: 10 Mb/s or 100 Mb/s.

show fddi alerts

The **show fddi alerts** command displays all FDDI modules that are enabled but not up. Use this display to identify interfaces that are not working.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the FDDI module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Admin State	Configured state of the FDDI interface: Up or Down.
HW Address	Line's physical address. The driver assigns this address.
Operational State	State of the line driver: Up, Down, Init (initializing), or Not Pres (not present). The Not Pres state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Total Time Up/Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s*** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m*** where *dd* is days, *hh* is hours, and *mm* is minutes. For example, the value might appear as `2d10h15m`.

(continued)

Errors	Total number of errors (see **show fddi errors** for greater detail).
MTU	Maximum transmission unit size -- the maximum frame length allowed on the wire, excluding frame delimiters such as the preamble and the ending delimiter. The MTU of a FDDI frame is 4495 octets.

show fddi detail

The **show fddi detail** command displays the MIB data about all FDDI circuits or a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

show fddi errors

The **show fddi errors** command displays receive, transmit, and system errors for all circuits or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Receive Errors	
Slot/Conn	Slot location of the FDDI module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
CRC Errors	Number of frames received with CRC errors.
Overrun Errors	Number of frames received with internal overrun errors.
Invalid Frames	Number of badly formed frames received from the FDDI ring; frames that do not contain a valid Frame Status field of at least three control indicator symbols (that is, E, A, C, flags).
Frames Too Long	Number of frames received that exceed the MTU size.
Transmit Errors	
Slot/Conn	Slot location of the FDDI module within the chassis and the connector number.
Aborted Frames	Number of transmit frames with internal abort errors on this circuit.
Underrun Errors	Number of transmit frames aborted with underrun errors on this circuit.
System Errors	
Slot/Conn	Slot location of the FDDI module within the chassis and the connector number.
Parity Errors	Number of parity errors. Parity errors may indicate faulty hardware. If this count exceeds five, contact your Bay Networks Technical Solutions Center.
Ring Errors	Number of ring errors.

(continued)

Port Operation Errors	Number of DMA controller port operation errors. Port operation errors may indicate faulty hardware. If this count exceeds five, contact your Bay Networks Technical Solutions Center.
Internal Operation Errors	Number of internal operation errors.
Host Errors	Number of parity errors occurring when the host driver accesses a register on the DMA controller. Host errors may indicate faulty hardware. If this count exceeds five, contact your Bay Networks Technical Solutions Center.

show fddi mac

The **show fddi mac** command displays the media access control (MAC) parameters for all circuits or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the FDDI module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Upstream Neighbor	MAC address of the upstream neighbor. The Neighbor Information protocol within SMT determines this address. The value 00 00 00 00 00 00 indicates that the address is unknown. The table represents the address in canonical form.
Downstream Neighbor	MAC address of the downstream neighbor. The Neighbor Notification protocol within SMT determines this address. The value 00 00 00 00 00 00 indicates that the address is unknown. The table represents the address in canonical form.
TNeg (ms)	Target token rotation time (TTRT) carried in claim frames that the FDDI station transmits. This value is in milliseconds.

(continued)

Management State	State of the Ring Management (RMT) within SMT. RMT reports the status of the MAC, including stuck beacon conditions. It initializes the trace function, and detects duplicate address conditions that prevent the ring from operating. RMT passes through a variety of states as follows: *Isolated* - Initial state of RMT. *NonOp* - MAC being managed is participating in ring recovery and the ring is not operational. *RingOp* - MAC being managed is part of an operational FDDI ring. *Detect* - Ring has not been operational for a certain period of time. In this state, RMT detects duplicate addresses, a condition that prevents ring operation. *NonOpDup* - MAC under control is a duplicate of another MAC on the ring. The ring is not operational in this state. *RingOpDup* - MAC under control is a duplicate of another MAC on the ring. The ring is operational in this state. *Directed* - RMT has instructed the MAC it is controlling to send beacon frames notifying the ring of a stuck condition. Beacon frames indicate that the interface does not see the token and that this condition should be transient. If this state persists, contact your Bay Networks Technical Solutions Center. *Trace* - RMT has initiated the trace function.
Operational Count	Number of times the ring has entered the “Ring Operational” state from the “Ring Not Operational” state. This count is updated when there is a change in the state, but does not have to be exact.

show fddi port

The **show fddi port** command displays FDDI port attributes.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the FDDI module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Local Port	Physical connector type of the local port, as follows: *A* - Port is a dual-attachment station or concentrator that attaches to the primary IN and the secondary OUT when attaching to the dual FDDI ring. *B* - Port is a dual-attachment station or concentrator that attaches to the secondary IN and the primary OUT when attaching to the dual FDDI ring. *M* - Port is in a concentrator that serves as a master to a connected station or concentrator. *S* - Port is in a single attachment station. *Unknown* - Type of the port is unknown.
Neighbor Port Type	Physical connector type of the remote port: A, B, M, S, Unknown.

(continued)

Physical State	State of the Physical Connection Management (PCM) for each port within SMT. PCM initializes the connection of neighboring ports and manages signaling between ports. PCM provides the necessary signaling to initialize a connection, withhold a marginal connection, and support maintenance features. PCM passes through a variety of states, as follows: *Off* - Initial state of PCM. *Break* - Starting a PCM connection. *Trace* - Localizing a stuck beacon condition, which indicates that the interface does not see the token. This state should be a transient condition. If it persists, contact your Bay Networks Technical Solutions Center. *Connect* - Synchronizing the ends of the connection for the signaling sequence. *Next* - Separating the signaling performed in the SIGNAL state. *Signal* - Communicating individual bits of information across the connection. *Join* - Assuring that both ends of the connection enter the ACTIVE state together when signaling has completed. *Verify* - Leading to an active connection. *Active* - Incorporating the port into the token path. *Maint* - Detecting maintenance state.
Link Error Monitor Count	Number of times a link has been rejected.
Elasticity Buffer Errors	Number of elasticity buffer errors for a specific Physical Layer Protocol (PHY). The elasticity buffer tracks clock tolerances between stations.
Link Confidence Count	Number of consecutive times the link confidence test has failed during Connection Management.

show fddi sample

The **show fddi sample** command displays data sampled from FDDI interfaces over a period of 10 seconds. You can change the number of seconds over which you want to sample the data, and you can display sampled data for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-period *<number_of_seconds>*	Displays data sampled during the period (number of seconds) specified.
-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the FDDI module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Input Rate/<sec.> (bytes/sec)	Number of bytes received without error. This byte count includes LLC frames only.
Input Rate/<sec.> (Pkts/sec)	Number of frames received without error. This frame count includes LLC frames only.
Output Rate/<sec.> (bytes/sec)	Number of bytes transmitted without error. This byte count includes LLC and SMT frames only.
Output Rate/<sec.> (Pkts/sec)	Number of frames transmitted without error. This frame count includes LLC and SMT frames only.
Input Lack of Resource	Number of LLC receive ring overrun events.
Output Lack of Resource	Number of frames clipped in the driver's transmit routine due to congestion.

show fddi stats

The **show fddi stats** command displays transmit and receive statistical information for all circuits or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the FDDI module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
State	State of the line driver: Up, Down, Init (initializing), or Not Pres (not present). The Not Pres state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Errors:	
Receive	Number of frames received with: • CRC errors • Internal overrun errors • MAC errors The total number of receive errors also includes the number of badly formed LLC frames received from the FDDI ring and the number of received LLC frames whose length exceeded the MTU size.
Transmit	Number of transmit frames with internal abort errors or aborted with underrun errors.

(continued)

Bytes:	
Receive	Number of octets received without error.
Transmit	Number of octets transmitted without error.
Frames:	
Receive	Number of frames received without error.
Transmit	Number of frames transmitted without error.
Avg. Pkt.:	
Receive	Average packet size (number of bytes divided by number of frames) received without error.
Transmit	Average packet size (number of bytes divided by number of frames) transmitted without error.
Multicast:	
Receive	Number of packets received that are not unicast packets.

show fddi summary

The **show fddi summary** command displays the current configuration for all FDDI circuits or a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the FDDI module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Admin State	Configured state of the FDDI interface: Up or Down.
HW Address	Line's physical address. The driver assigns this address.
Operational State	State of the line driver: Down, Init (initializing), Not Present (enabled but not yet started), or Up. The Not Present state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Total Time Up/Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s*** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m*** where *dd* is days, *hh* is hours, and *mm* is minutes. For example, the value might appear as `2d10h15m`.

(continued)

Errors	Total number of receive, transmit, and system errors (see **show fddi errors** for greater detail). This value also includes: • Port operation error events • SMT receive ring error events • LLC/SMT transmit ring error events • Host error events
MTU	MTU size for frames on this line.

show token-ring alerts

The **show token-ring alerts** command displays all token ring modules that are enabled but not up. Use this display to identify interfaces that are not working.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the token ring module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Admin State	Configured state of the token ring interface: Up or Down.
HW Address	Line's physical address. The driver assigns this address.
Operational State	State of the line: Up, Down, Init (initializing), or Not Pres (enabled but not yet started). The Not Pres state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.

(continued)

Total Time Up/Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m** where *dd* is days, *hh* is hours, and *mm* is minutes. For example, the value might appear as `2d10h15m`.
Errors	Total number of errors (see **show token-ring errors** for greater detail).
MTU	Maximum transmission unit size for this interface; that is, the largest frame that can be transmitted or received across the token ring module. The MTU is 4568 bytes.
Speed	Speed of the token ring media -- 4 Mb/s or 16 Mb/s.

show token-ring detail

The **show token-ring detail** command displays all MIB data about all token ring circuits or a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

show token-ring errors

The **show token-ring errors** command displays receive, transmit, system, line, and ring errors for all circuits or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Receive Errors	
Slot/Conn	Slot location of the token ring module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Line Errors	Number of frames that this station copied with bad format or Frame Check Sequence (FCS) errors.
Burst Errors	Number of frames with no bit transition for 5-1/2-bit times.
Transmit Errors	
Slot/Conn	Slot location of the token ring module within the chassis and the connector number.
Lost Frame Errors	Number of outbound frames whose transmission failed because they were corrupted on their trip around the token ring. The interface detects this condition while stripping a frame off the ring. In small quantities, this error indicates small disturbances on the token ring.
System Errors	
Slot/Conn	Slot location of the token ring module within the chassis and the connector number.
Adapter Checks	Number of internal adapter errors that caused adapter failures.
DMA Bus Errors	Number of bus errors during DMA that did not exceed the threshold.
DMA Parity Errors	Number of parity errors during DMA that did not exceed the threshold.

(continued)

Command Timeouts	Number of times a command timeout caused the interface to reinitialize.
Host Interface Errors	Number of times a receive-host interface error caused the interface to reinitialize.
Line Errors	
Slot/Conn	Slot location of the token ring module within the chassis and the connector number.
ARI/FCI Errors	Number of times that this station received both an AMP MAC frame and an SMP MAC frame with the a and c bits clear, or more than one SMP MAC frame with the a and c bits clear without an intervening AMP MAC frame. This condition indicates that the upstream neighbor is unable to set the a and c bits in a frame that it copied.
Frame Copied Errors	Number of frames addressed to this station that had their a and c bits previously set.
Token Errors	Number of token protocol errors; relevant only when this station is the active monitor.
Soft Errors	Number of soft errors; corresponds to the number of Report Error MAC frames that this station has transmitted.
Ring Errors	
Slot/Conn	Slot location of the token ring module within the chassis and the connector number.
Beacon Events	Number of events causing the adapter to transmit beacon frames. Beacon frames indicate that the interface does not see the token. If this count goes up, contact your Bay Networks Technical Solutions Center.
Signal Losses	Number of ring signal losses detected.
Auto Removes	Number of times lobe wrap tests failed during beacon autoremoval.
Removes Received	Number of Remove Ring Station MAC frames received. Each frame causes this station to leave the ring.
Single Stations	Number of interrupts caused by a change to the ring status while the adapter is the only station on the ring.
Cable Faults	Number of interrupts caused by opens or shorts (cable faults) between the adapter and the MAU.
Ring Recoveries	Number of Claim Token MAC frames (ring recoveries) observed on the ring.

show token-ring sample

The **show token-ring sample** command displays data sampled from token ring interfaces over a period of 10 seconds. You can change the number of seconds over which you want to sample the data, and you can display sampled data for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-period *<number_of_seconds>*	Displays data sampled during the period (number of seconds) specified.
-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the token ring module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Input Rate/<sec.> (bytes/sec)	Number of bytes received without error.
Input Rate/<sec.> (Pkts/sec)	Number of frames received without error.
Output Rate/<sec.> (bytes/sec)	Number of bytes transmitted without error.
Output Rate/<sec.> (Pkts/sec)	Number of frames transmitted without error.
Input Lack of Resource	Number of frames dropped due to receive congestion.
Output Lack of Resource	Number of frames clipped in the driver's transmit routine due to congestion.

show token-ring stats

The **show token-ring stats** command displays token ring input/output statistical information for all token ring circuits or for a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the token ring module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
State	State of the line: Up, Down, Init (initializing), or Not Pres (enabled but not yet started). The Not Pres state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Errors:	
Receive	Number of frames that this station copied with bad format or Frame Check Sequence (FCS) errors, or frames with no bit transition for 5-1/2-bit times.
Transmit	Number of transmit frames with internal abort errors or aborted with underrun errors.
Bytes:	
Receive	Number of octets received without error.
Transmit	Number of octets transmitted without error.
Frames:	
Receive	Number of frames received without error.
Transmit	Number of frames transmitted without error.

(continued)

Avg. Pkt.:	
Receive	Average packet size (number of bytes divided by number of frames) received without error.
Transmit	Average packet size (number of bytes divided by number of frames) transmitted without error.
Multicast:	
Receive	Number of packets received that are not unicast packets.

show token-ring summary

The **show token-ring summary** command displays the current configuration for all token ring circuits or a specific circuit or slot.

This command allows for the following command filters (flags) and filter arguments:

-circuit *<circuit_name>*	Displays information about the specified circuit only.
-slot *<slot>*	Displays information about the specified slot only.
<circuit_name>	Displays information about the specified circuit only.

The output includes the following information:

Slot/Conn	Slot location of the token ring module within the chassis and the connector number.
Circuit	Name of the circuit associated with this line.
Admin State	Configured state of the token ring interface: Up or Down.
HW Address	Line's physical address. The driver assigns this address.
Operational State	State of the line: Up, Down, Init (initializing), or Not Pres (enabled but not yet started). The Not Pres state occurs for several reasons. For example, the link module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.

(continued)

Total Time Up/Down	If the line is not up (Operational State does not equal Up), then three dashes (---) appear. If the line is up (Operational State equals Up), then the value appears in the form: *hh***h***mm***m***ss***s*** where *hh* is hours, *mm* is minutes, and *ss* is seconds. For example, the value might appear as `5h31m05s`. If the value is greater than 24 hours, it appears in the form: *dd***d***hh***h***mm***m** where dd is days, hh is hours, and mm is minutes. For example, the value might appear as `2d10h15m`.
Errors	Total number of errors (see **show token-ring errors** for greater detail).
MTU	MTU size for this interface; that is, the largest frame that can be transmitted or received across the token ring module. The MTU is 4568 bytes.
Speed	Speed of the token ring media -- 4 Mb/s or 16 Mb/s.

Glossary

Attribute	See *parameter.* Properties or functional aspects of a configurable MIB object.
Channel	The multiplexed signal for one voice or data conversation, running simultaneously with other channels over a single logical or physical line.
Circuit	A data communication path established between two network hosts; for example, a permanent or switched virtual circuit (PVC or SVC) over a packet- or cell-switched network, or over a dial or leased-line connection.
Connector	The physical and electrical means to interconnect an interface module in a network device directly or indirectly to a physical network medium.
Interface	A data link/physical layer connection to a physical network transmission medium. An interface includes media-specific driver software.
Flow control	Temporarily stops a remote station from sending packets to prevent packet loss in a congested system.
Line	The physical medium that completes a circuit path, identified typically by connector, slot, and media type. In a *multiline* circuit, one circuit uses multiple lines for added bandwidth.
Logical line	See *line*. A logical path on a physical circuit.
Parameter	See *attribute*. A BCC or Site Manager variable that defines a specific MIB attribute or set of MIB attributes.
Port	See *connector.* On a network device or a user end station, a logical point of termination for data sent or received by a specific protocol or application.
Slot	The physical and electrical means to interconnect an interface module in a network device directly or indirectly to a physical network medium.

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